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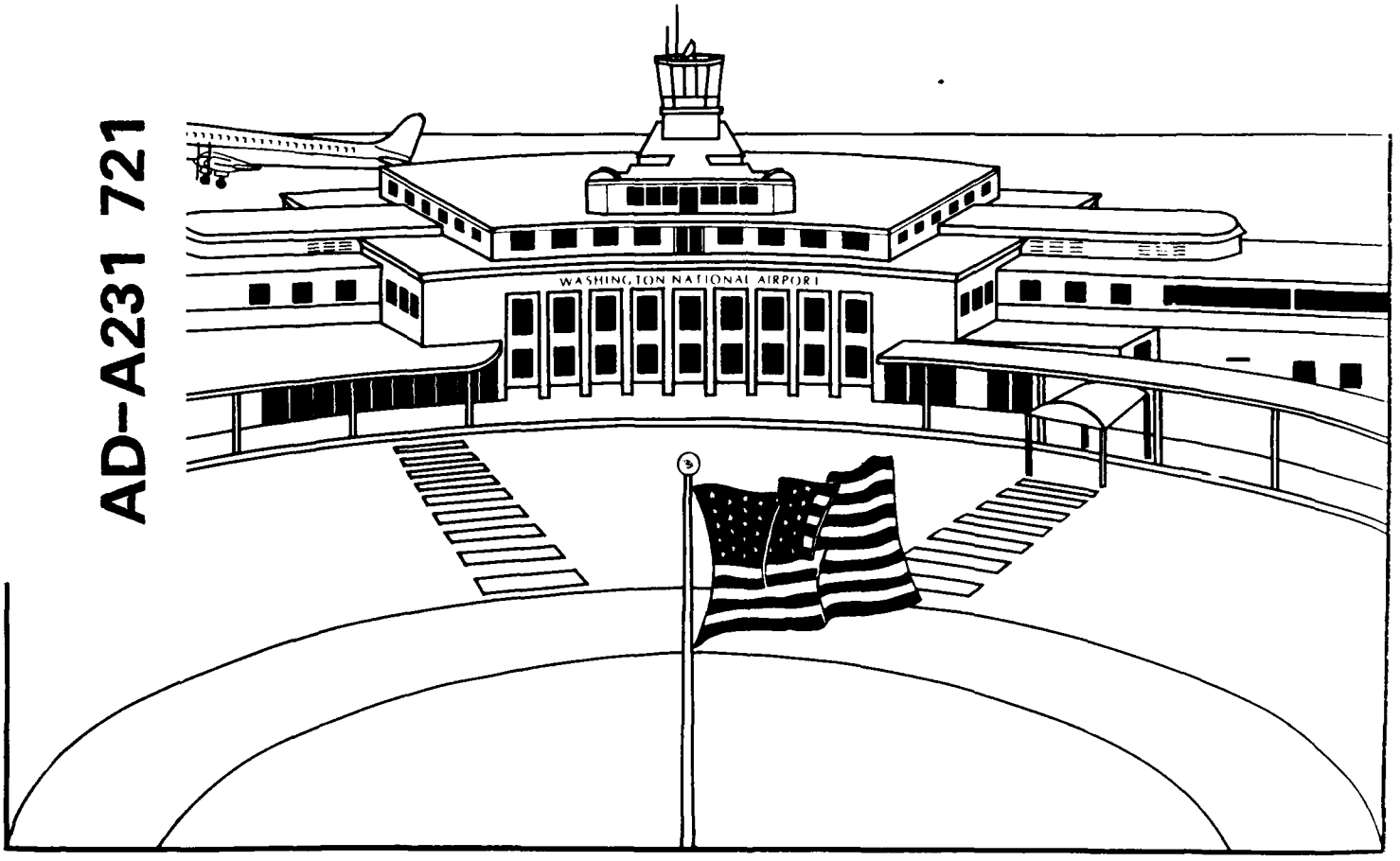

FISCAL YEARS 1991–2002

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16. Abstract

This report contains the Fiscal Years 1991-2002 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the major users of the National Aviation System: air carriers, air taxi-commuters, non-military and general aviation. The forecasts have been prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public.

After a downturn in economic growth in 1991, caused largely by an escalation in oil prices, the overall outlook for the 12-year forecast period is for continued economic growth, declining real fuel prices, and moderate inflation. Based upon these assumptions, aviation activity by fiscal year 2002 is forecast to increase by 27.4 percent at towered airports, 30.1 percent at air route traffic control centers, and 6.5 percent in flight services performed. Hours flown by general aviation are forecast to increase 17.5 percent and domestic revenue passenger miles (RPM's) are forecast to increase 62.6 percent, with scheduled international RPM's forecast to increase by 110.8 percent and regionals/commuters RPM's forecast to increase by 140.4 percent.

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PREFACE

I am pleased to submit to the aviation community FAA Aviation Forecasts, Fiscal Years 1991-2002. These forecasts are developed annually by Gene S. Mercer and his staff in the Forecast Branch for use by the agency in its planning and decision-making processes. In addition, these forecasts are used extensively within the aviation and transportation communities as the industry looks to and prepares for the future.

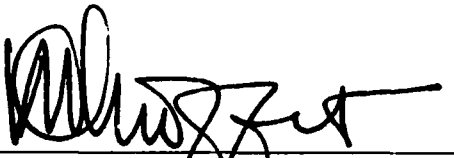
This year's report again consists of ten chapters, discussing in detail four major areas: (1) the economic environment, assumptions, and predictions which are used to develop the forecasts; (2) discussions, historical data and forecasts of future traffic and aircraft activity for each of the major non-military user groups--commercial air carriers, regional/commuter airlines, general aviation, and helicopters; (3) workload measures for FAA towers, centers, and flight service stations; and (4) aviation traffic and aircraft activity at large, medium, and small hub airports, as well as summary information from two special hub forecasts completed in 1989--one for Denver and the State of Colorado and the other for Miami/Ft. Lauderdale and environs. The report concludes with a discussion of our forecast accuracy (which I am pleased to report has been very high in the short-term of two to three years and reasonable in the long-term of ten to twelve years) and year-by-year data for our individual forecasts of aviation activity.

Briefly, the forecast predicts continued expansion of both the U.S. economy and U.S. aviation activity after a brief downturn in fiscal 1991 caused by our current economic recession and higher oil prices brought on by the Iraqi crisis. Based on economic projections which the Office of Management and Budget provides through fiscal year 1996 and which DRI/McGraw-Hill, Evans Economics, and the WEFA Group provide through 2002, we expect the U.S. economy (as measured by real gross national product) to grow at an average annual rate of 3.1 percent between 1992 and 1996 and 2.4 percent between 1997 and 2002, with higher increases projected for many major foreign countries and regions. These economic projections, when combined with critical industry factors (such as airline capacity) and the expertise of industry analysts, result in anticipated average annual aviation growth (as measured in revenue passenger miles) of 4.9 percent between 1992 and 1996 and 4.4 percent between 1997 and 2002, with international growth being significantly higher.

In reading and using the information contained in this book, it is important to recognize the limits of forecasting. That is, forecasting is not an exact science and is only as precise as are the critical economic and political assumptions that go

into it. Though normally this is a difficult process, it is a manageable one since the degree of economic or political uncertainty is relatively narrow. This year, however, the situation is significantly different. As we go to press, the Middle East crises brought on by Saddam Hussein's illegal occupation of Kuwait is still unresolved and with it the cost and availability of oil and the depth and length of the current economic recession remain uncertain and highly debateable issues among industry experts. Hence, the accuracy of these forecasts, especially the short-term forecasts, may require significant revision if (1) the Middle East crisis is not resolved quickly, (2) there is any significant and long-term destruction of oil production and transportation facilities, and/or (3) the economic recession is deeper or longer than currently anticipated.

Again, I am pleased to submit to the aviation community this year's forecast of aviation and FAA activity through the year 2002. If in using this document you see opportunities for improvement, I would appreciate hearing from you in order that we may improve the usefulness of our forecasts and this document. You are encouraged to send your comments to me at the Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C. 20591.



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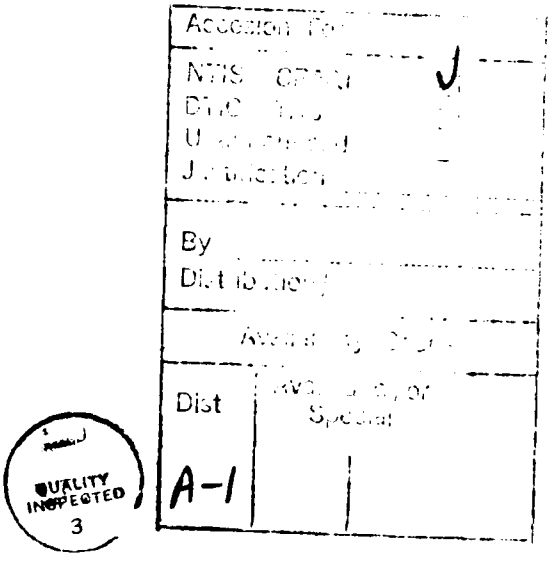

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CHAPTER 1

EXECUTIVE SUMMARY

CHAPTER I

EXECUTIVE SUMMARY

On August 2, 1990, Iraq invaded Kuwait. With the resultant U.S. military build-up, the Civil Reserve Air Fleet (CRAF) program activated approximately 50 U.S. air carrier aircraft on August 17 for the first time since the program was instituted in 1952. Also, as the world price of oil soared, the price U.S. air carriers paid for jet fuel doubled, from fifty-five cents in July to one dollar and eleven cents in October. The U.S. airlines were unable to increase their operating revenues to match the unanticipated jump in operating expenses. As a result, many airlines found themselves in financial difficulty. Continental Air Lines filed for bankruptcy on December 3rd, with Pan American filing on January 8th. (In fact, ATA estimates an industry loss of over $2 billion in calendar 1990). Depending on the length and severity of the current crisis, the much discussed, steady consolidation of the industry could be accelerated.

In addition, there has been a slowing of the national economy. In this situation, the more successful U.S. air carriers that have been posting significant profits over the past few years seem better prepared to cope with slower traffic growth. Three carriers, American, Delta, and United, today carry approximately 50 percent of total industry traffic. They are also showing significant growth in international markets. As we enter the decade of the nineties, we will see continued change in the airline industry. Since the enactment of the Airline Deregulation Act of 1978, we have witnessed a number of structural and operational changes in the commercial aviation industry. There had been a proliferation of low fares which was partially responsible for the dramatic increase in passenger traffic. Many communities saw improved air service with increased frequencies through connecting hub airports to multiple destinations. The more successful air carriers had significant increases in their operating profits. However, with the industry now facing an economic downturn at the same time that operating costs are escalating, airline management faces a difficult challenge. With globalization of the commercial aviation industry proceeding at a rapid pace as new marketing agreements between U.S. and foreign flag carriers are being announced almost daily, international competition has become rigorous. The race among the world's air carriers is to put together the most effective global system. The outlook for the airline industry worldwide is for continued strong growth as we enter the nineties, continuing well into the twenty-first century. Which of the U.S. carriers will still be operating in ten years? Decisions being made today will determine the viability of the airline of tomorrow.

The regional/commuter airlines have also experienced unique challenges and changes since deregulation. The number

of carriers increased from 210 in 1978 to 250 in 1981, then declined to 151 in 1990. In addition, the regional/commuter airlines have become increasingly integrated with the large, scheduled air carriers through code-sharing agreements and/or through acquisition in part or in total by their larger partners. Airlines have changed the structure of their routing systems from predominantly linear operations to a system of hub and spokes. The development of connecting hub airports has led to high levels of activity in peak hours at major air carrier airports. Over the past three years, much of the growth in domestic traffic occurring in the regional/commuter portion of the industry resulted from the major carriers replacing large aircraft service with smaller aircraft operated by their regional/commuter partners in many of their hub markets. The U.S. experience with code-sharing agreements between the large air carriers and regional/commuter airlines suggests that the smaller carriers benefit from working relationships with the larger airlines. In future years, the same could hold true for competition in international markets.

The production and sale of general aviation aircraft, avionics, and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance, and insurance make the general aviation industry an important contributor to the nation's economy. The single engine piston aircraft market is the base on which general aviation activity builds. New pilots are trained in single engine piston aircraft and work their way up through retractable landing gear and multi-engine piston to turbine aircraft. When the single engine piston market declines, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at many FAA facilities.

Since 1978 there has been a dramatic decline in shipments of all types of general aviation aircraft. A number of reasons have been advanced for this, chief among them being rapid price increases, high interest rates, and expensive fuel throughout this period. A portion of the price increases can be attributed to massive awards assessed against manufacturers in product liability lawsuits. This triggered extreme increases in liability insurance premiums driving up manufacturer's costs. Recent data, however, suggest that the downturn of the past decade in aircraft shipments may have bottomed out. Also, with further congestion and delay developing at major air carrier airports as the commercial industry expands, the demand for business-general aviation seems to be expanding.

The FAA plans to meet forecast demands for the aviation system as reflected in this document. The FAA must do this in a way that provides safe and efficient transportation for all people who use and depend upon the National Airspace System.

REVIEW OF 1990

In fiscal year 1990, the large U.S. air carriers increased their system capacity (seat miles) by 6.3 percent, while demand (revenue passenger miles) increased 5.8 percent. The net result was a decrease in the load factor to 62.8 percent, down from 63.0 percent in 1989.

The airlines, for a third consecutive year, have continued to expand in international markets faster than in their domestic markets. The airlines' international traffic increased 14.3 percent, while domestic traffic increased only 3.2 percent. The airlines were able to achieve, through effective yield management and the avoidance of destructive fare wars, a

1.4 percent increase in average fares. However, the airlines' average fuel cost increased 19.9 percent during fiscal year 1990, while total operating expenses increased by 14.6 percent. Operating revenues increased by 9.7 percent. This resulted in the U.S. commercial airlines reporting a small operating profit of $17 million for fiscal year 1990 compared to a profit of $2.7 billion in fiscal year 1989.

Airline profits over the past several years have been concentrated among a relatively few carriers. The future viability of individual carriers, and possibly the entire industry, is highly dependent on the national economy. The current slowing of the U.S. economy and over-capacity in the industry may cause economically distressed carriers to engage in fare wars to generate cash. If this occurs, there will be few winners and many losers.

New commercial aircraft orders totaled 1,059 in fiscal year 1990, while 625 new aircraft were delivered. Narrow-body aircraft orders and deliveries continue to exceed the demand for wide-body aircraft. This reflects the air carriers' continuing reliance on increased schedule frequency, rather than larger aircraft, to accommodate projected passenger demand.

The growth of the regional/commuter airline industry continued to exceed the growth of the larger commercial carriers in fiscal year 1990. Total revenue passenger enplanements increased by 15.6 percent to 37.1 million, while revenue passenger miles increased by 19.6 percent to 6.7 billion.

In fiscal year 1990, there were 1,276 general aviation aircraft shipments. This consisted of 711 single engine piston aircraft, 108 twin, and 457 turbine powered. Billings increased by 1.8 percent over 1989 to just over $2 billion.

In fiscal year 1990, air carrier operations at FAA air traffic control towers increased by 3.2 percent. Air taxi/commuter and general aviation operations increased by 6.0 and 3.2 percent, respectively. As a result, total operations and instrument operations at FAA air traffic control towers and aircraft handled by the Air Route Traffic Control Centers achieved their forecast growth levels last year.

In summary, the impacts of deregulation continue to alter the commercial aviation industry. There has been some recovery of the general aviation industry, and activity at FAA facilities continues to exhibit moderate to strong growth.

ECONOMIC FORECASTS

Following a brief two-quarter recession, 1991 and beyond should show moderate to strong recovery. Jet fuel prices, which have risen significantly since the Gulf crisis, should moderate in the second half of 1991 and decline somewhat in 1992. For the balance of the forecast period, the outlook is for plentiful and affordable fuel provided the Middle East conflict is resolved without any significant destruction of oil fields, refineries, and transportation facilities. With moderating oil prices, inflation should remain moderate through the decade. The projected growth of aviation is consistent with the national long-term economic growth forecast. The table on page 6 is a summary of the key economic assumptions used in developing this forecast. It should be recognized that in any given year there may be some perturbation from the long-term trend, because none of the economic models is sufficiently precise to predict interim business cycles or unanticipated developments, like the Iraqi invasion of Kuwait.

FAA FORECAST ECONOMIC ASSUMPTIONS

FISCAL YEARS 1991 - 2002

ECONOMIC VARIABLE	HISTORICAL 1985	1989	1990	FORECAST 1991	1992	2002	PERCENT AVERAGE ANNUAL GROWTH 85-90	89-90	90-91	91-92	90-2002
Gross National Product (Billions 1982$)	3,559.7	4,099.2	4,152.2	4,130.7	4,229.6	5,548.9	3.1	1.3	(0.5)	2.4	2.4
Consumer Price Index (1982-84 = 100)	106.6	121.2	127.1	134.4	139.8	220.6	3.6	4.9	5.7	4.0	4.7
Oil & Gas Deflator (1982 = 100)	95.5	85.0	91.5	111.6	80.0	144.3	(1.6)	7.7	22.0	(28.3)	3.9

Source: 1991-96; Executive Office of the President, Office of Management and Budget

1997-2002; Consensus growth rate of Data Resources, Inc., Evans Economics, Inc., and The WEFA Group

AVIATION ACTIVITY FORECASTS

Domestic air carrier revenue passenger miles are forecast to increase at an annual rate of 4.1 percent during 1990-2002. During the same time period, domestic enplanements are forecast to increase by 3.8 percent annually, a rate somewhat slower than revenue passenger mile growth due to longer average passenger trip lengths. Air carrier aircraft operations are forecast to increase at an annual rate of 2.4 percent over the forecast period. The high growth in revenue passenger miles and enplanements relative to operations assumes higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths.

International air carrier revenue passenger miles are forecast to increase at an annual rate of 6.4 percent during 1990-2002. This high growth rate is being driven by the strong growth rates being projected for the Pacific Rim markets. During this same period, international enplanements are forecast to increase by 5.9 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths in the Pacific.

In 1991, the regional/commuter airlines are expected to enplane 39.7 million passengers, 8.7 percent of all passenger traffic in scheduled domestic air service. By the year 2002, these carriers are expected to carry 78.6 million passengers and to account for 10.7 percent of all domestic passenger enplanements. Regional/commuter airlines are expected to continue the trend toward purchase of small jet aircraft and larger, propeller-driven aircraft.

Increased business use of general aviation is reflected in the changing character of the fleet. The more expensive and sophisticated turbine-powered part of the fixed wing fleet is expected to grow much faster than the piston aircraft portion between 1990-2002. In 1990, there were 10,700 turbine-powered aircraft in the fixed wing general aviation fleet--5.2 percent of the total fixed wing fleet. By the year 2002, it is projected that there will be 15,200 turbine-powered aircraft--7.3 percent of the total fixed wing fleet. Similarly, in the helicopter fleet in 1990 there were 4,200 turbine-powered aircraft--56.8 percent of the total fleet. By the year 2002, it is projected that there will be 8,600 turbine-powered aircraft--76.8 percent of the total helicopter fleet.

The various FAA aviation traffic and activity forecasts are summarized numerically in the table on page 8.

FAA WORKLOAD FORECASTS

The FAA forecasting process is a continuous one which involves FAA Forecast Branch's interaction with various FAA Offices and Services, other government agencies, and aviation industry groups, including individual discussions with most major carriers and manufacturers. In addition, the process uses various economic and aviation data bases, the outputs of several econometric models and equations, and other analytical techniques. The FAA workload measures, summarized numerically in the table on page 9, are the resultant forecasts of this process and are used annually by the agency for manpower and facility planning.

Aviation activity at FAA facilities is expected to continue the growth pattern that began in 1983. The demand for FAA operational services is anticipated to increase over the forecast period as a

AVIATION ACTIVITY FORECASTS

FISCAL YEARS 1991 - 2002

AVIATION ACTIVITY	HISTORICAL 1985	1989	1990	FORECAST 1991	1992	2002	PERCENT AVERAGE ANNUAL GROWTH 85-90	89-90	90-91	91-92	90-2002
AIR CARRIER											
Enplanements (Millions)											
Domestic	350.4	415.6	424.0	419.3	434.9	666.9	3.9	2.0	(1.1)	3.7	3.8
International	24.6	36.8	41.2	43.3	46.8	81.8	10.9	12.0	5.1	8.1	5.9
System	375.0	452.4	465.2	462.6	481.7	748.7	4.4	2.8	(0.6)	4.1	4.0
RPM's (Billions)											
Domestic	265.8	328.4	339.1	335.4	348.8	551.5	5.0	3.3	(1.1)	4.0	4.1
International	64.8	100.6	115.1	121.0	132.5	242.8	12.2	14.4	5.1	9.5	6.4
System	330.6	429.0	454.2	456.4	481.3	794.3	6.6	5.9	0.5	5.5	4.8
COMMUTERS/REGIONALS											
Enplanements (Millions)	23.0	32.1	37.1	39.7	42.7	78.6	10.0	15.6	7.0	7.6	7.1
RPM's (Billions)	3.6	5.6	6.7	7.4	8.0	16.2	13.2	19.6	10.5	8.1	7.6
FLEET											
Air Carrier	2,938	3,870	4,017	4,079	4,272	5,508	6.5	3.8	1.5	4.7	2.7
Commuter	1,551	1,782	1,819	1,860	1,925	2,264	3.2	2.1	2.3	3.5	1.8
General Aviation (000)	220.9	210.3	219.7	223.9	225.8	231.5	(0.1)	4.5	1.9	0.9	0.4
HOURS FLOWN (Millions)											
Air Carrier	7.7	10.1	10.2	10.5	11.0	14.6	5.8	1.0	2.9	4.8	3.0
General Aviation	36.2	34.7	35.4	35.8	36.3	41.6	(0.4)	2.0	1.1	1.4	1.4

Source: 1985-90; RSPA, FAA DATA
1991-2002; FAA Forecast

FAA WORKLOAD MEASURES

FISCAL YEARS 1991 - 2002

WORKLOAD MEASURES (IN MILLIONS)	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1985	1989	1990	1991	1992	2002	85-90	89-90	90-91	91-92	90-2002
Aircraft Operations											
Air Carrier	11.3	12.5	12.9	13.2	13.5	17.1	2.7	3.2	2.3	2.3	2.4
Air Taxi & Commuter	6.9	8.3	8.8	9.2	9.6	12.8	5.0	6.0	4.6	4.4	3.2
General Aviation	37.2	37.8	39.0	39.4	40.0	48.2	0.9	3.2	1.0	1.5	1.8
Military	2.5	2.8	2.8	2.8	2.8	2.8	2.3	0.0	0.0	0.0	0.0
TOTAL	57.9	61.4	63.5	64.6	65.9	80.9	1.9	3.4	1.7	2.0	2.0
Instrument Operations											
Air Carrier	11.8	13.6	14.0	14.3	14.6	18.6	3.5	2.9	2.1	2.8	2.4
Air Taxi & Commuter	6.4	8.4	9.4	9.8	10.2	13.4	8.0	11.9	4.2	4.1	3.0
General Aviation	16.4	18.6	19.1	19.3	19.7	25.0	3.1	2.7	1.1	2.1	2.3
Military	4.1	4.5	4.4	4.4	4.4	4.4	1.4	(2.2)	0.0	0.0	0.0
TOTAL	38.7	45.0	46.8	47.8	48.9	61.4	3.9	4.0	2.1	2.3	2.3
IFR Aircraft Handled											
Air Carrier	14.6	17.5	18.6	19.0	19.6	24.9	5.0	6.3	2.1	3.2	2.5
Air Taxi & Commuter	4.8	5.2	5.6	5.9	6.2	8.3	3.1	7.7	5.4	5.1	3.3
General Aviation	8.3	8.2	7.9	8.1	8.3	10.2	(1.0)	(3.7)	2.5	2.5	2.2
Military	5.0	5.7	5.5	5.5	5.5	5.5	1.9	(3.5)	0.0	0.0	0.0
TOTAL	32.7	36.6	37.6	38.5	39.6	48.9	2.9	2.7	2.4	2.9	2.2
Flight Services											
Pilot Briefs	14.6	12.0	11.5	11.4	11.5	12.0	(4.9)	(4.2)	(0.9)	0.9	0.4
Flight Plans Originated	8.0	7.4	7.0	6.8	7.0	7.9	(2.7)	(5.4)	(2.9)	2.9	1.0
Aircraft Contacted	7.7	6.2	6.0	5.9	5.8	6.0	(5.1)	(3.2)	(1.7)	(1.7)	0.0
TOTAL	52.9	45.0	43.0	42.3	42.8	45.8	(4.2)	(4.4)	(1.6)	1.2	0.5

Source: FY 1985-90; FAA Data

FY 1991-2002; FAA Forecasts

result of continued growth in aviation activity. Total aircraft operations at FAA towered airports are forecast to increase to 80.7 million in the year 2002, a 2.0 percent annual growth rate over the 63.5 million operations achieved in 1990.

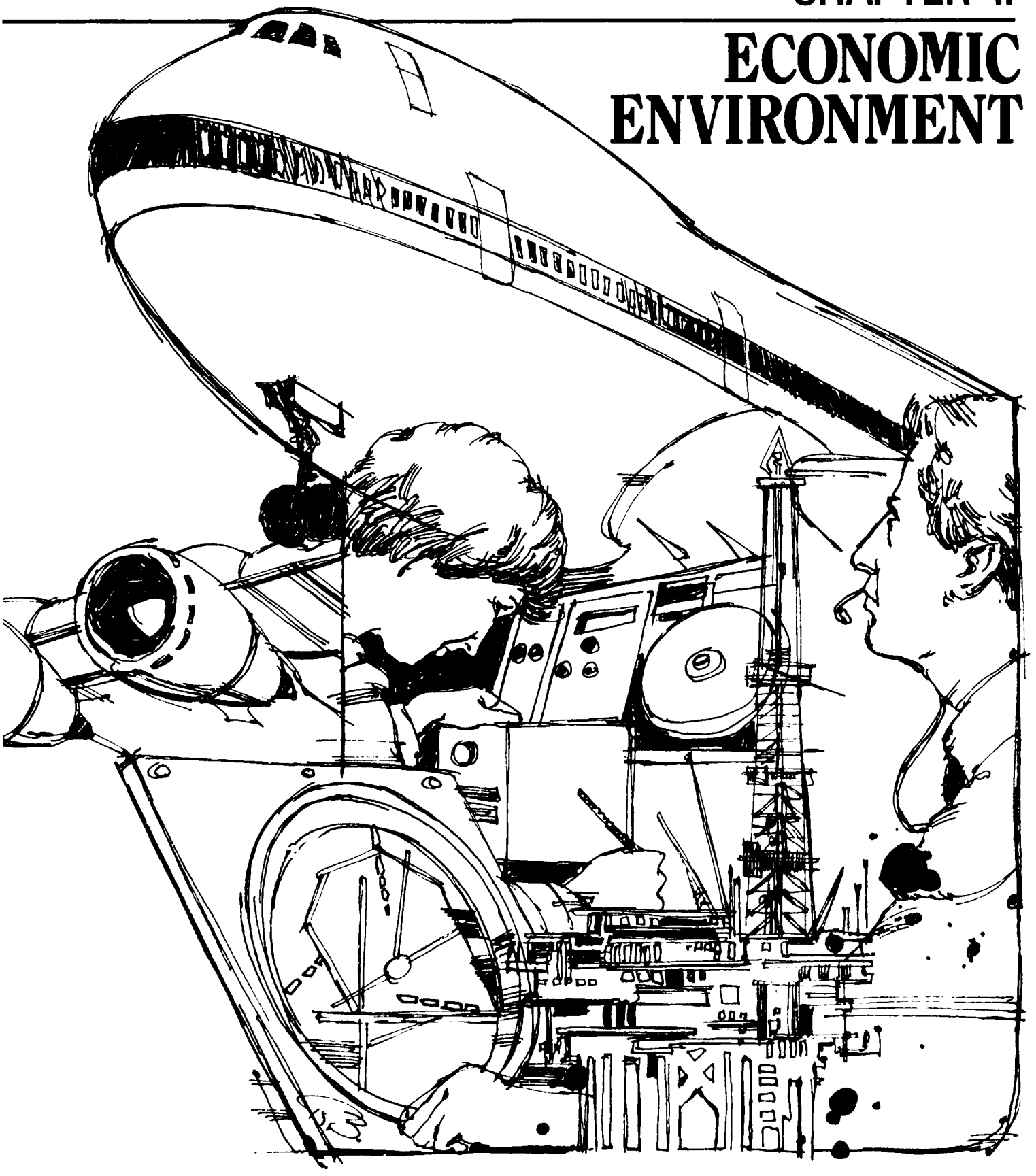
The increased use of avionics by regional/commuter airlines and general aviation and the implementation of additional Airport Radar Service Areas will contribute to instrument operations at FAA towered airports growing faster than total aircraft operations. Instrument operations are forecast to increase from 46.8 million in 1990 to 61.4 million in the year 2002, a 2.3 percent annual growth rate.

The workload at the Air Route Traffic Control Centers is forecast to increase at an average annual rate of 2.2 percent between 1990-2002. The number of commuter/air taxi aircraft handled are expected to increase at a faster rate than the other user categories--58.8 percent from 5.6 million in 1990 to 8.3 million in fiscal year 2002.

In summary, aviation activity at FAA facilities is expected to continue to grow at about the same rate as the general economy. Aviation will continue to dominate all other transportation modes in the commercial intercity passenger market. Regional/commuter aircraft activity and the business use of general aviation are expected to experience greater growth than the larger, established airlines and personal use of general aviation.

CHAPTER II

ECONOMIC ENVIRONMENT



CHAPTER II

ECONOMIC ENVIRONMENT

REVIEW OF 1990

UNITED STATES

In fiscal year 1990, the seventh full year of expansion, gross national product adjusted for price changes only rose 1.3 percent indicating a slowing of the national economic expansion. The consumer price index for all urban consumers rose 4.9 percent, indicating additional inflationary pressures. Increasing demand has continued to exert upward pressure on fuel prices as the oil and gas deflator increased 7.1 percent in fiscal year 1989 and 7.7 percent in fiscal year 1990.

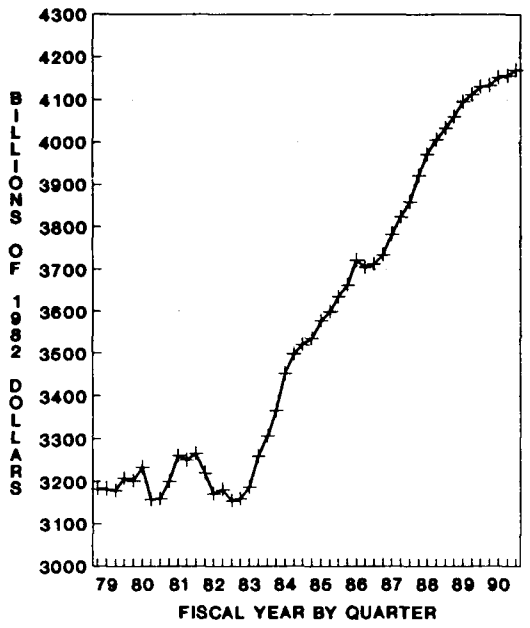
These trends, as reflected on page 14, signaled that the economic downturn that had been predicted off and on over the past few years had finally materialized. Then with the invasion of Kuwait on August 2nd, oil prices increased significantly, which further weakened the economy. Other sectors of the economy--e.g. the savings and loan bailout, potential problems with other financial institutions, housing starts down, rising unemployment (6.1 percent in December), and the continuing U.S. trade deficit ($11.6 billion in October)--also contributed to the downturn. These factors also contributed to a further weakening of the economy and a deterioration of consumer sentiment as measured by the University of Michigan. These factors are reflected in the graphics on page 15. During 1990, the stock market has remained volatile. Aviation has contributed to the volatility as shown by the relative values and broader swings shown by the Dow Jones Transportation Index and by the Standard and Poors Aviation Index. The graphics on page 16 show the relative change between October 7, 1988 and December 28, 1990. The graphics show much more variation for the Dow Jones Transportation Index than the Dow Jones Industrials Index. There is even more variation for the Standard and Poors Aviation Index, reflecting, in particular, the actual and rumored leveraged buyout activities of several airlines during the past two years as well as the precarious financial position of many U,S. airlines. Many investors have still not returned to the stock market. Money that would have been invested in the stock market is now in other less risky investments.

WORLD

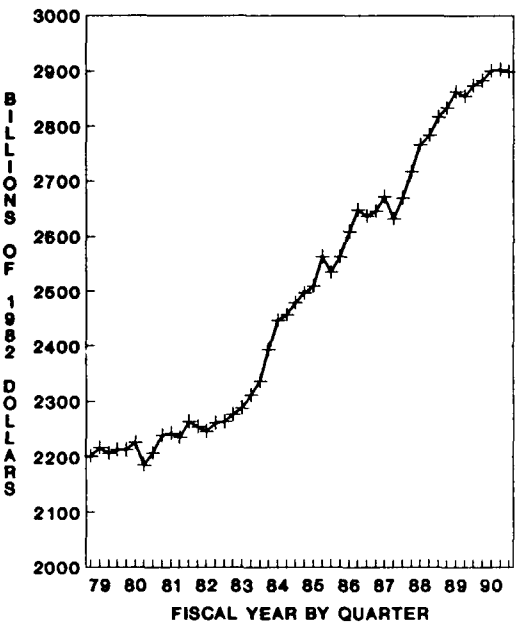
The economic health of various regions of the world are a component of any forecast for the U. S. air carriers. The combined gross domestic product for Europe, Africa and the Middle East, adjusted for price changes, grew 5.0 percent in fiscal year 1990. The combined gross domestic product for Latin America (including South America, Central America and Mexico), adjusted for price changes, decreased 0.5 per-

U.S. ECONOMIC TRENDS I

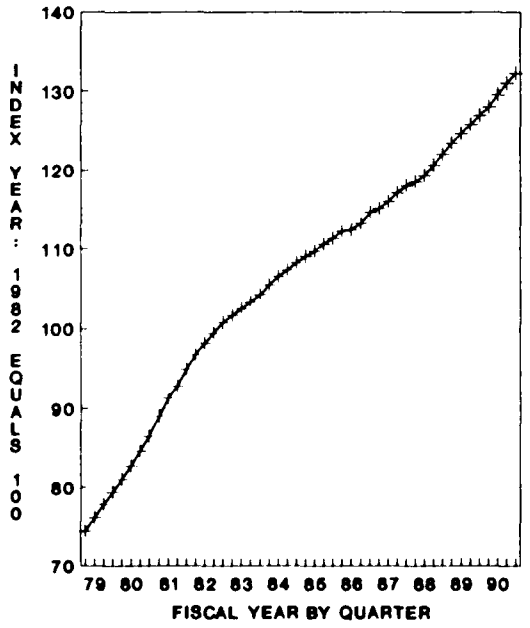
GROSS NATIONAL PRODUCT



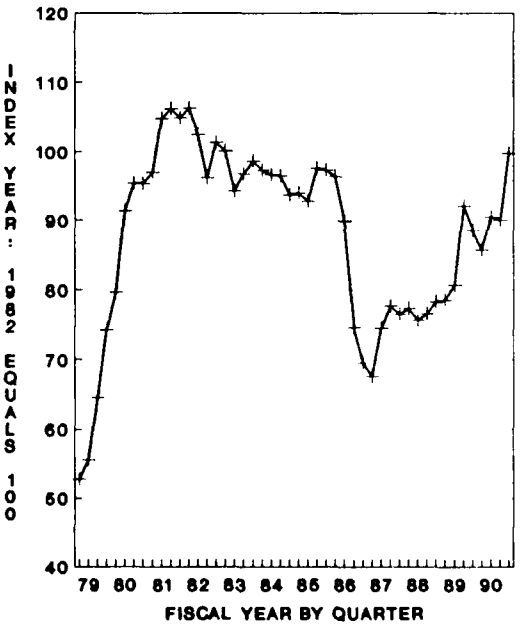
DISPOSABLE PERSONAL INCOME



IMPLICIT GNP DEFLATOR

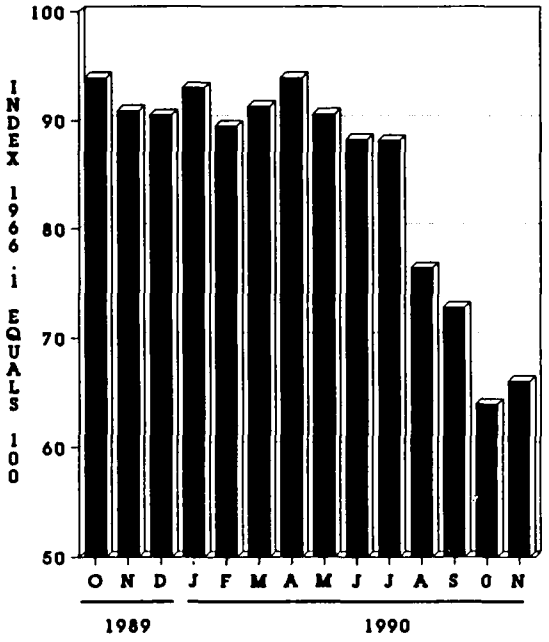


OIL AND GAS DEFLATOR

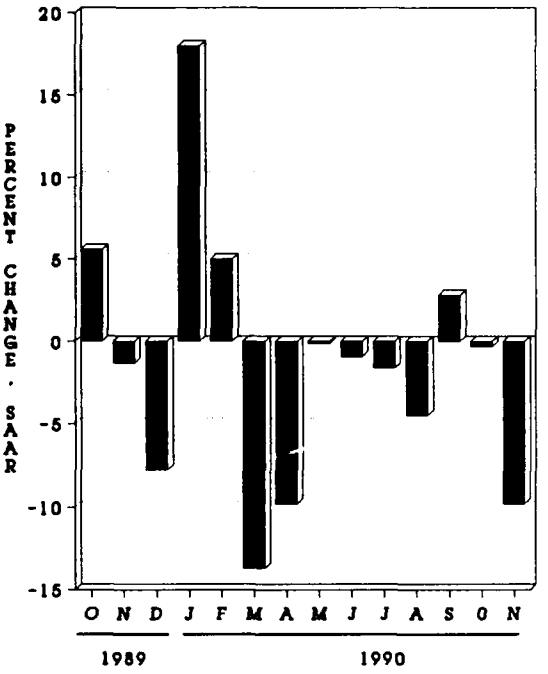


U.S. ECONOMIC TRENDS II

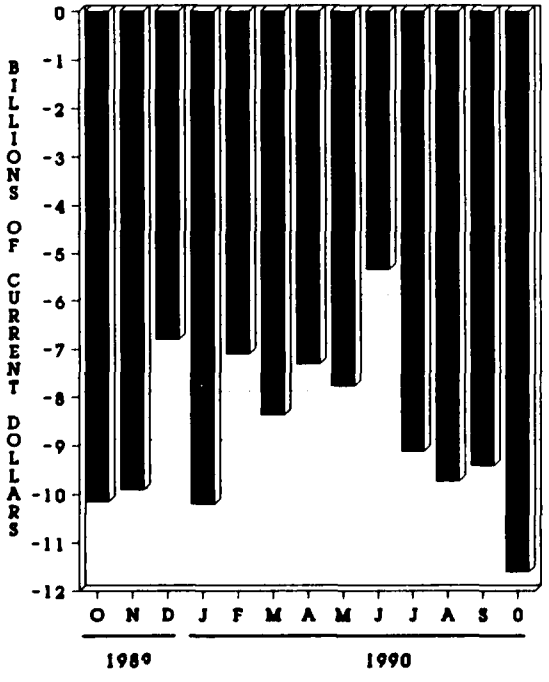
INDEX OF CONSUMER SENTIMENT
(UNIVERSITY OF MICHIGAN)



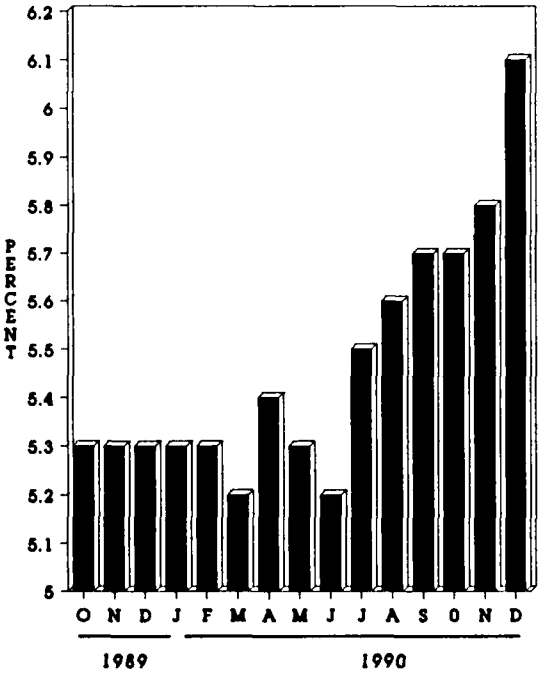
SINGLE FAMILY HOUSING STARTS



U.S. TRADE DEFICIT

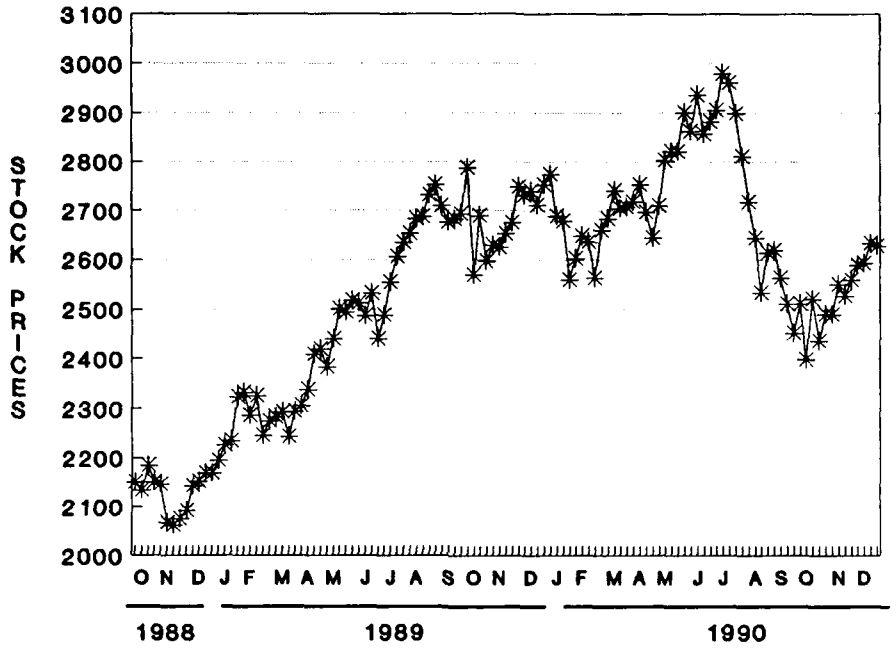


U.S. CIVILIAN UNEMPLOYMENT RATE

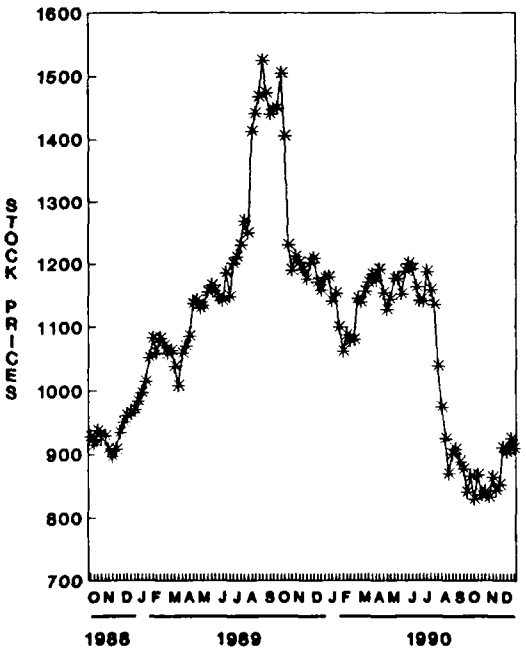


FRIDAY CLOSING STOCK PRICES
OCTOBER 7, 1988 TO DECEMBER 28, 1990

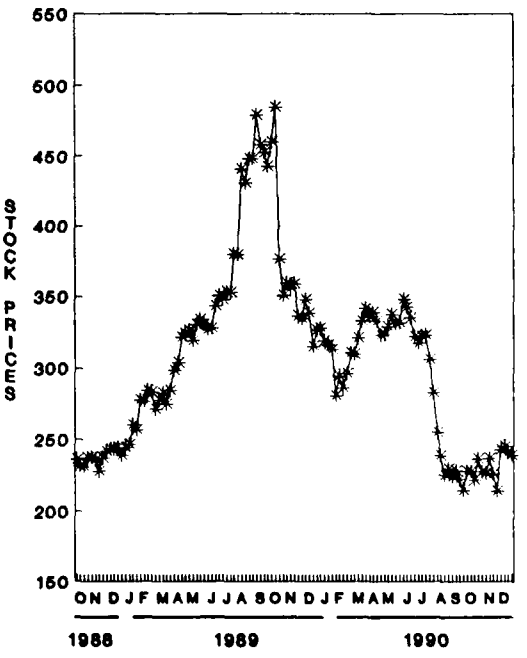
DOW JONES INDUSTRIAL



DOW JONES TRANSPORTATION



STANDARD AND POORS AIRLINES



cent in 1990. The combined gross domestic product for Japan, Australia, New Zealand, and the Pacific Basin countries, adjusted for price changes, grew 5.2 percent in 1990.

Inflation in Germany and Japan remained relatively low, with prices increasing by only 2.6 percent in 1990. Price inflation in the United Kingdom was considerably higher, increasing by 9.2 percent in 1990. These consumer price index data are representative of the wide diversity of inflation in various countries and must be taken into account in interpreting economic data.

The U.S. dollar declined against the Japanese yen in 1990, dropping 3.8 percent. The U.S. dollar also declined against the German deutsche mark in 1990, dropping 10.5 percent.

ECONOMIC FORECASTS

The economic scenario utilized in developing the FAA Baseline Aviation Forecasts for the period 1991-1996 was provided by the Executive Office of the President, Office of Management and Budget (OMB). For the period 1997-2002, the economic scenario utilized consensus growth rates of the economic variables prepared by DRI/ McGraw-Hill (DRI), Evans Econometrics, Inc. (Evans), and The WEFA Group. All of the indices presented here have a single base year, except for the Consumer Price Index; the Bureau of Labor Statistics has based the index on an average of the 1982 through 1984 time period (previously 1967). The U.S. effective exchange rate index and other international data were derived from The WEFA Group's World Economic Outlook.

The principal series utilized in the individual aviation models to develop the FAA aviation forecasts are discussed in the following pages. The data are presented in tabular form in Chapter X, Tables 1 through 5.

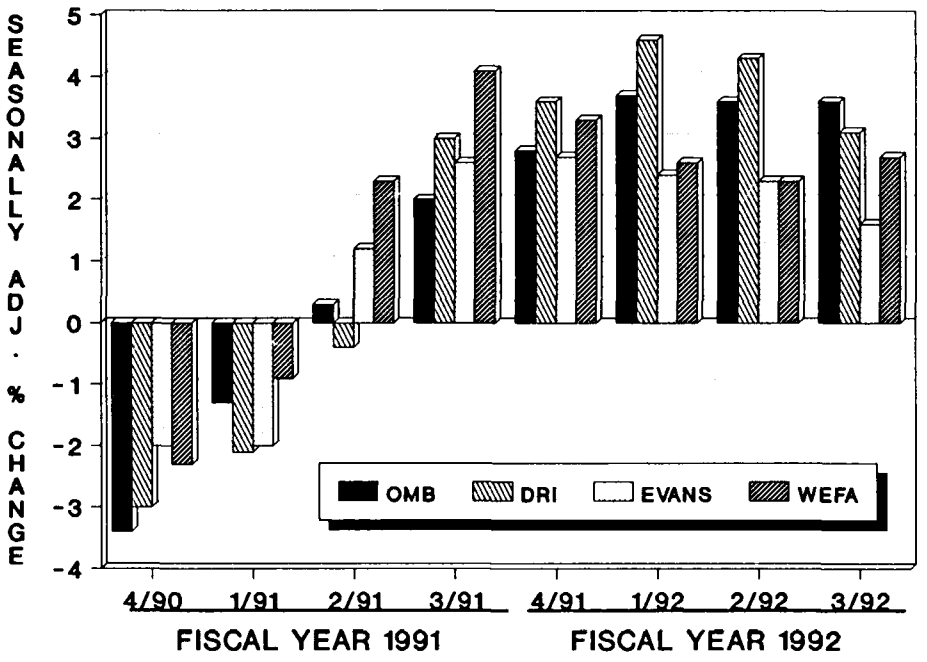
THE SHORT-TERM ECONOMIC OUTLOOK

An economic downturn has been a possibility for several years but did not materialize until fiscal year 1991. The charts on page 18 illustrate some of the opinions of the "economic experts" as to the short-term (two-year) outlook for the economy. All four forecasts project a recession (at least two quarters of negative growth) in fiscal year 1991. The official forecast utilized by the FAA (OMB), projects negative GNP growth (down 0.5 percent) in fiscal year 1991 before turning upward in fiscal year 1992 (up 2.4 percent). The only disagreement among the various forecasts seems to be how soon and how fast the economy will recover.

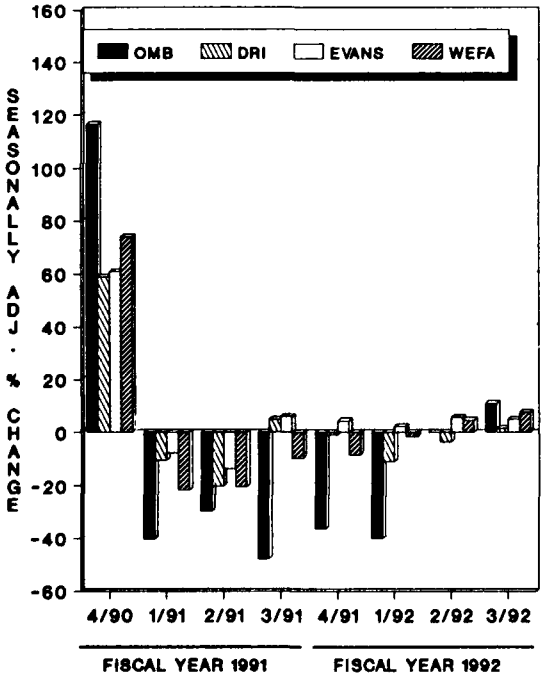
The U.S. economy and the airline industry have greatly benefitted from the general decline in world energy prices since 1981. Conversely, the recent increase in energy prices results in lower economic growth and increased aviation costs. The rebound in oil prices that occurred following the Gulf Crisis is reflected in the OMB forecast of a 22.0 percent increase in fiscal year 1991 for the oil and gas deflator. DRI, Evans, and WEFA reflect slightly larger increases of 19.8, 22.2, and 15.5 percent, respectively, in fiscal year 1991. In fiscal year 1992, OMB is predicting a 28.3 percent decline in the deflator, while DRI and WEFA, are forecasting more moderate declines of 4.9 and 5.7 percent. Evans looks for an increase of 1.3 percent. This economic variable will, to a large extent, determine the timing and speed of the U.S. economic recovery.

U.S. SHORT-TERM ECONOMIC FORECASTS

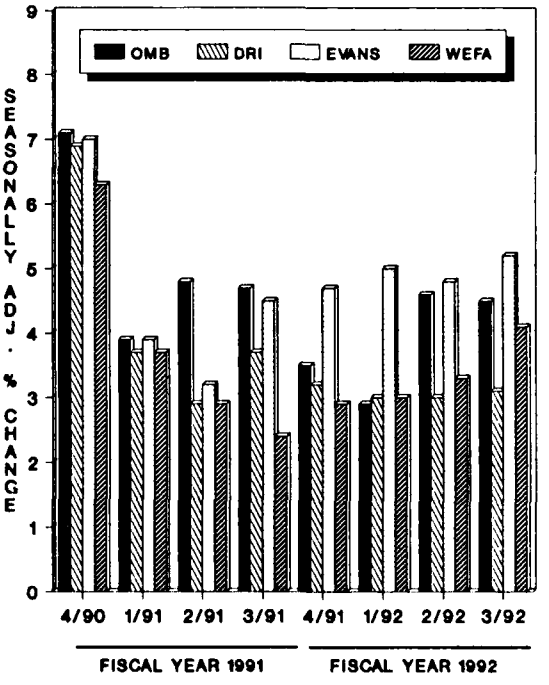
REAL GROSS NATIONAL PRODUCT



OIL AND GAS DEFLATOR



CONSUMER PRICE INDEX



THE LONG-TERM ECONOMIC OUTLOOK

Gross National Product

United States

As shown by the graph on page 20, gross national product (GNP), adjusted for price changes, is expected to grow at an annual rate of 2.4 percent during the forecast period. Annually, real gross national product should decrease by 0.5 percent in 1991, then increase 2.4 percent in 1992. GNP has proven to be a significant variable of business activity driving aviation growth.

World

As reflected by the graphs on page 21 the combined gross domestic product for Europe, Africa and the Middle East, adjusted for price changes, is expected to grow at an annual rate of 3.2 percent throughout the forecast period. Real gross national product will increase by 2.7 percent in 1991, then by 2.9 percent in 1992.

The combined gross domestic product for Latin America (including South America, Central America and Mexico), adjusted for price changes, is expected to grow at an annual rate of 3.8 percent throughout the forecast period. Real gross national product should increase by 3.5 percent in 1991, then 4.2 percent in 1992.

The combined gross domestic product for Japan, Australia, New Zealand, the Pacific Basin countries, adjusted for price changes, is expected to grow at an annual rate of 4.5 percent throughout the forecast period. Real gross national product should increase by 5.0 percent in 1991, then by 4.3 percent in 1992.

Consumer Price Index

United States

Consumer prices (CPI) are expected to remain in the moderate range, increasing at an average annual rate of 4.7 percent over the forecast period. Inflation is forecast to increase by 5.7 percent in 1991 and 4.0 percent in 1992. CPI is used to adjust airline fares and costs relative to other goods and services.

World

Consumer price inflation in West Germany is expected to remain low, increasing at an average annual rate of 2.9 percent over the forecast period. Inflation is forecast to increase by 3.6 percent in 1991 and 3.1 percent in 1992.

Consumer price inflation in the United Kingdom is expected to remain moderate, increasing by an average annual rate of 3.6 percent over the forecast period. Inflation is forecast to increase by 6.2 percent in 1991 and 4.5 percent in 1992.

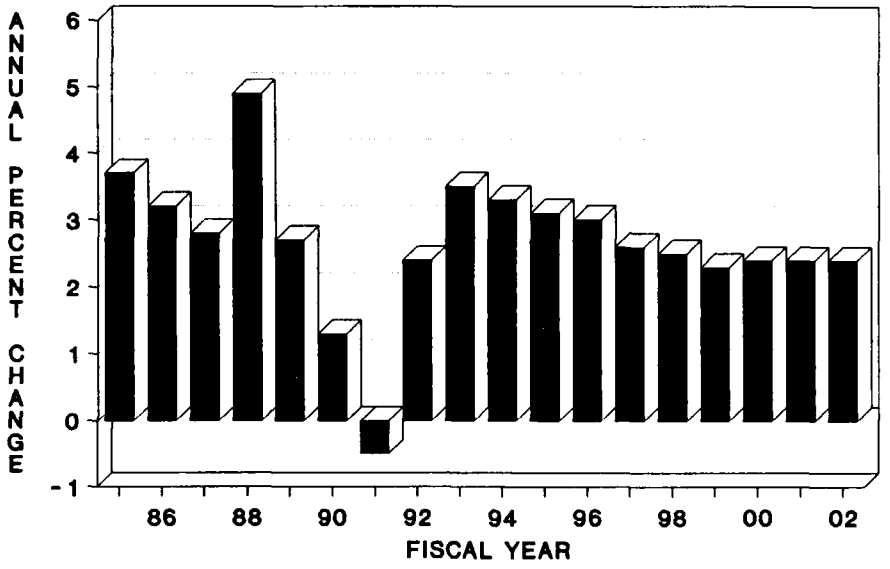
Consumer price inflation in Japan is expected to be moderate, increasing by an average annual rate of 3.0 per-cent over the forecast period. Inflation is forecast to increase by 2.4 percent in both 1991 and 1992.

Oil And Gas Deflator

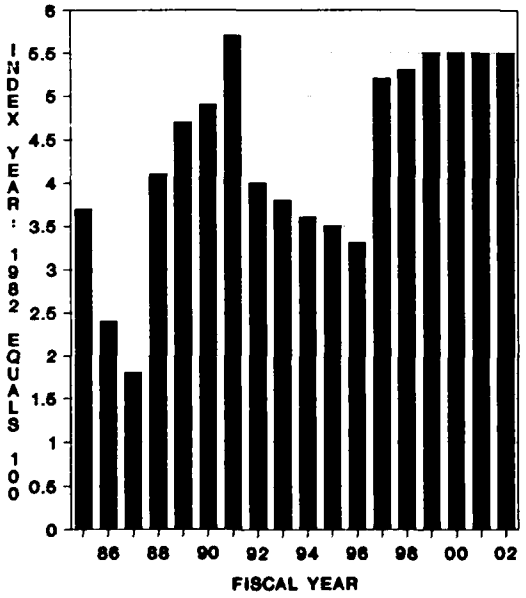
Over the entire forecast period, nominal fuel prices in the United States are predicted to increase at an annual rate of 3.9 percent, and real fuel prices are expected to decline by approximately 0.8 percent a year.

U.S. LONG-TERM ECONOMIC FORECASTS

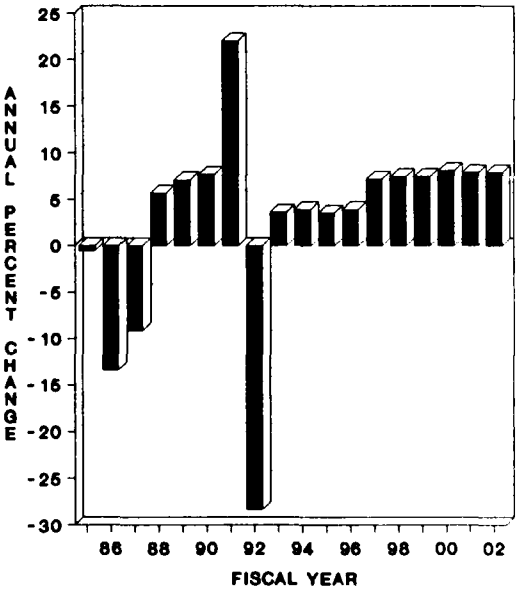
GROSS NATIONAL PRODUCT
(1982 DOLLARS)



CONSUMER PRICE INDEX
(1980-82$)

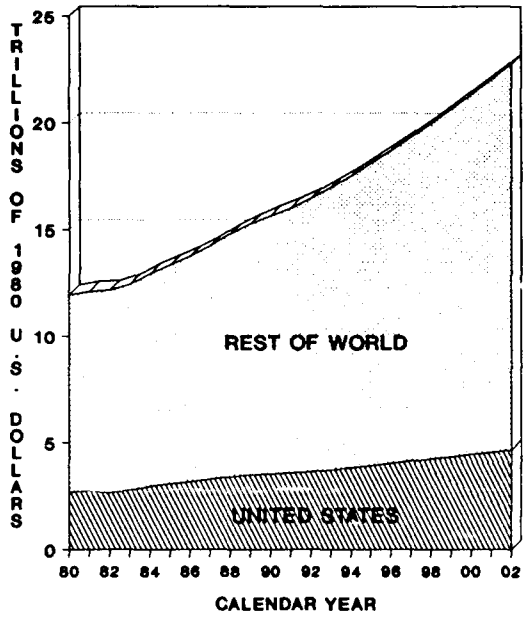


OIL AND GAS DEFLATOR
(1982 = 100)

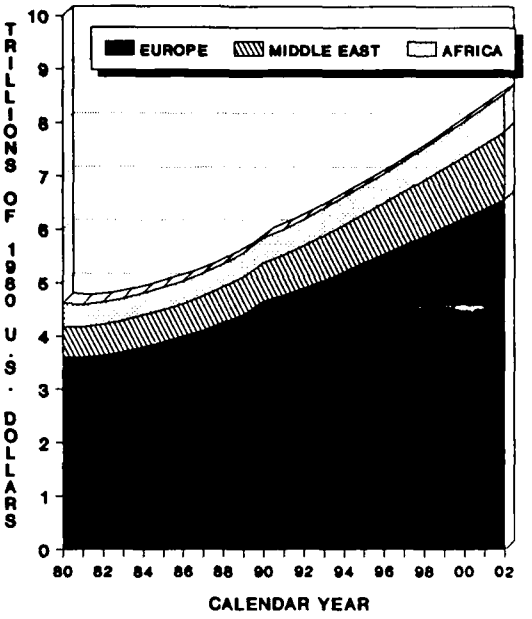


GROSS DOMESTIC PRODUCT BY WORLD REGIONS

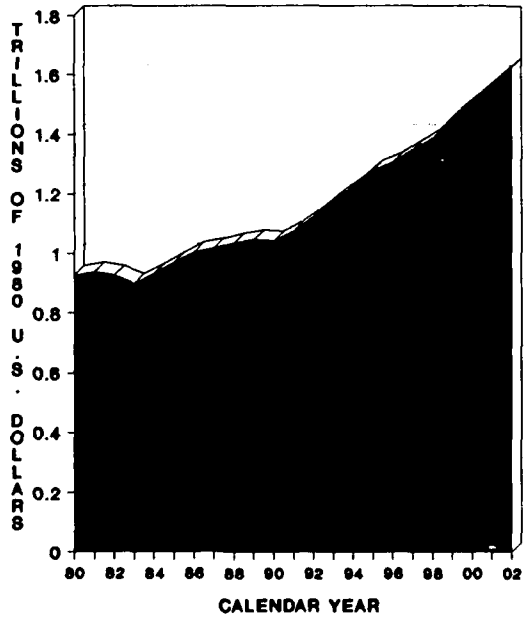
WORLD



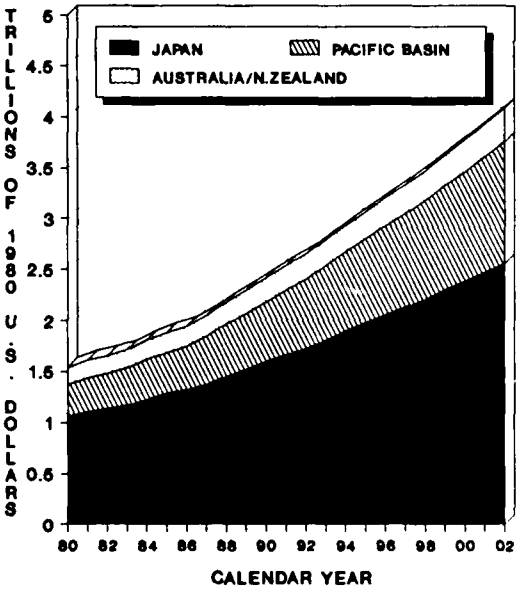
EUROPE/MIDDLE EAST/AFRICA



LATIN AMERICA



JAPAN/PACIFIC BASIN/ AUSTRALIA/NEW ZEALAND



Dollar Exchange Rate

United States

The charts on page 23 show that the U.S. dollar effective exchange rate is expected to decline through 1999. The index for the entire 12-year forecast period declines at an average annual rate of 0.8 percent per year. The decline is expected to be somewhat greater over the next several years, declining by 5.3 percent in calendar year 1991, by 1.1 percent in 1992, and by 1.2 percent in 1993. The projected decline in the U.S. effective exchange rate will make imports of foreign goods more expensive to U.S. buyers, possibly reducing imports. At the same time, it will make U.S. originating foreign travel more expensive and, conversely, travel to the U.S. by foreign nationals less expensive.

World

The German deutsche mark is expected to gain in value relative to the U.S. dollar, averaging 0.7 percent over the 12-year forecast period.

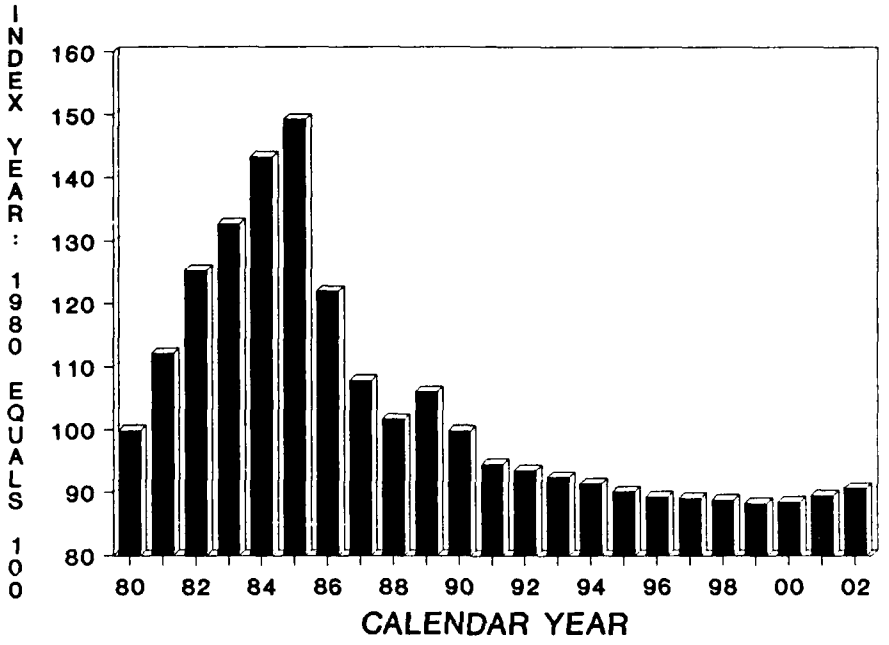
The Japanese yen is expected to gain in value relative to the U.S. dollar, averaging 2.0 percent over the forecast period.

DEMOGRAPHIC FACTORS

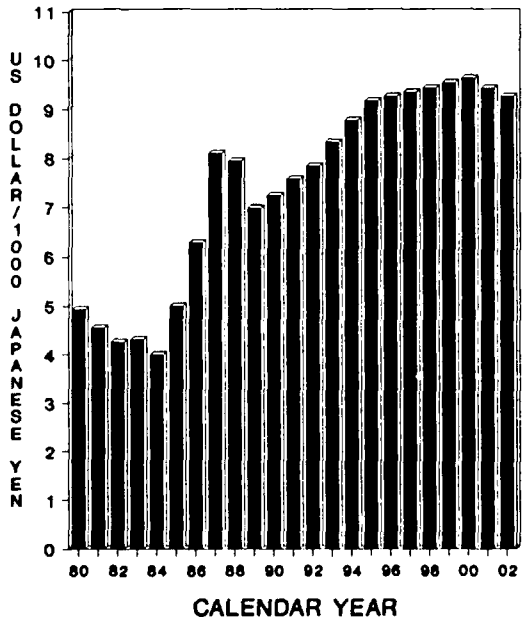
Demographic factors are being explored as a possible enhancement to our forecasting methods. A review of the literature shows that, while some question the role of demography in forecasting, there are a few key issues which should be addressed in pursuing this type of program. First of all, it is important to understand whether there is some long-run penetration ratio with regard to the incidence of air travel among the population in the United States. That is, while the percentages of people who have flown at least once in their lifetime and who flew in the last year have been increasing, the question is whether these parameters will increase in the future at decreasing rates. In addition, the more important question (and one for which sufficient data may not be available) is whether one can assume that today's 30 year olds will behave like today's 40 year olds 10 years in the future or whether they will behave differently. With only a 20-year time series of data, there has been perhaps only one cohort shift in the demographic characteristics of flyers in the population under study. This leads to the observation that the fundamental improvements in FAA's long-range forecasting techniques must not only consider demographic changes but also whether the propensity to engage in aviation activity will change within or across categories of the population. Existing work on long-term assessments of changing trends in aviation, however, may not provide a robust enough technical base of data for use in FAA forecasts. The graphs on page 24 depict recent airline traveler profiles based on the Air Transport Association's (ATA) 1989 Air Travel Survey.

EXCHANGE RATE TRENDS AND FORECASTS

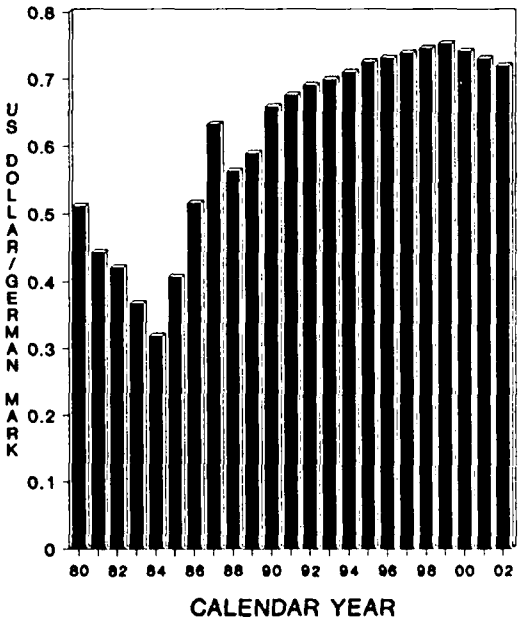
U.S. EFFECTIVE EXCHANGE RATE



JAPANESE YEN

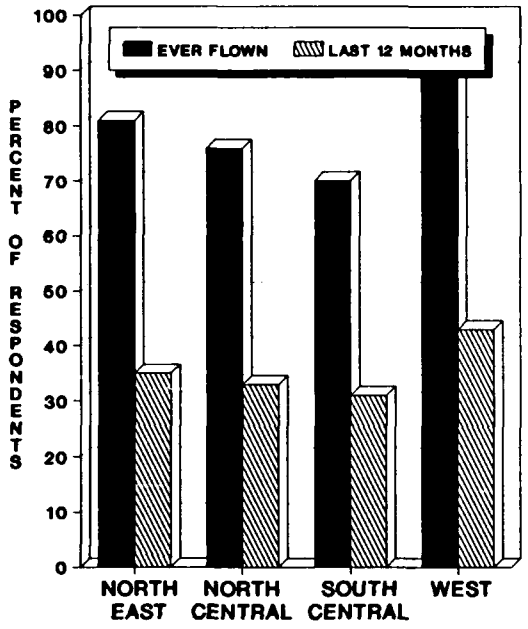


WEST GERMAN DEUTSCHE MARK

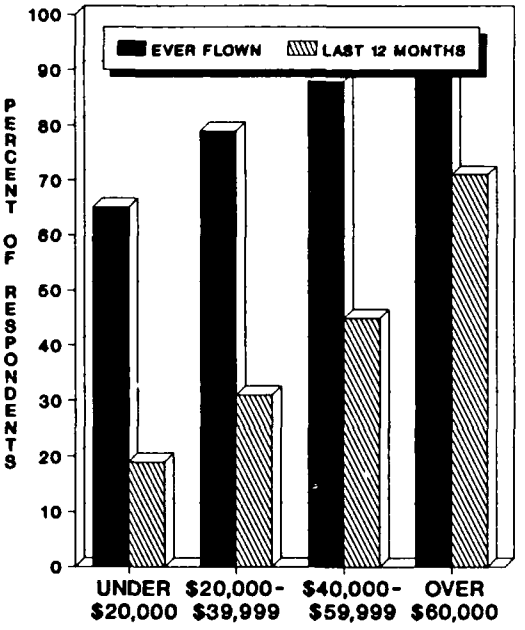


PROFILE OF AIRLINE TRAVELERS

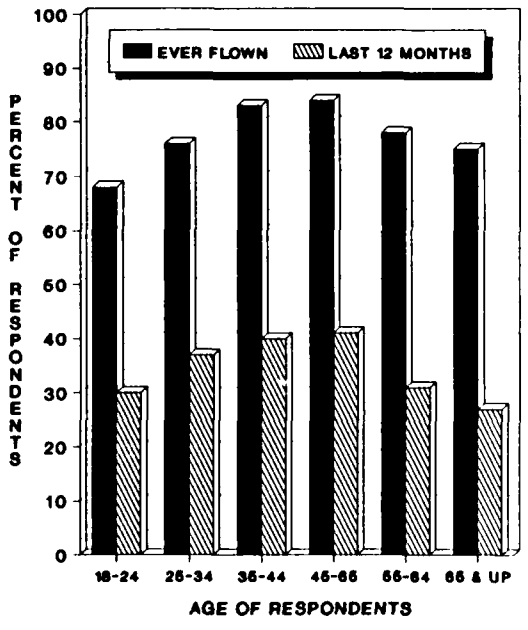
BY GEOGRAPHIC REGION



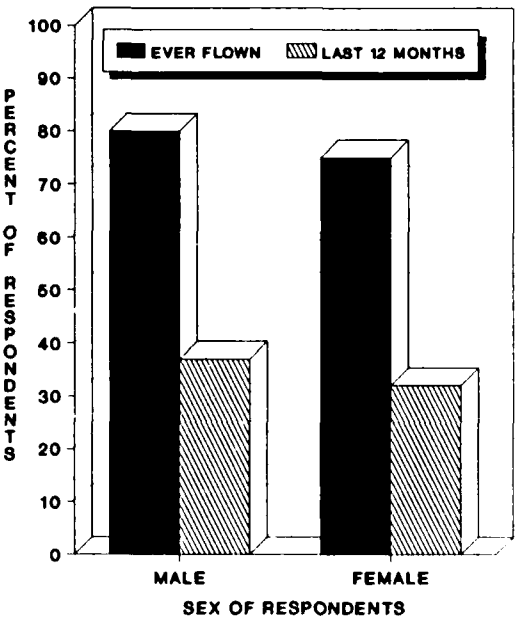
BY INCOME



BY AGE



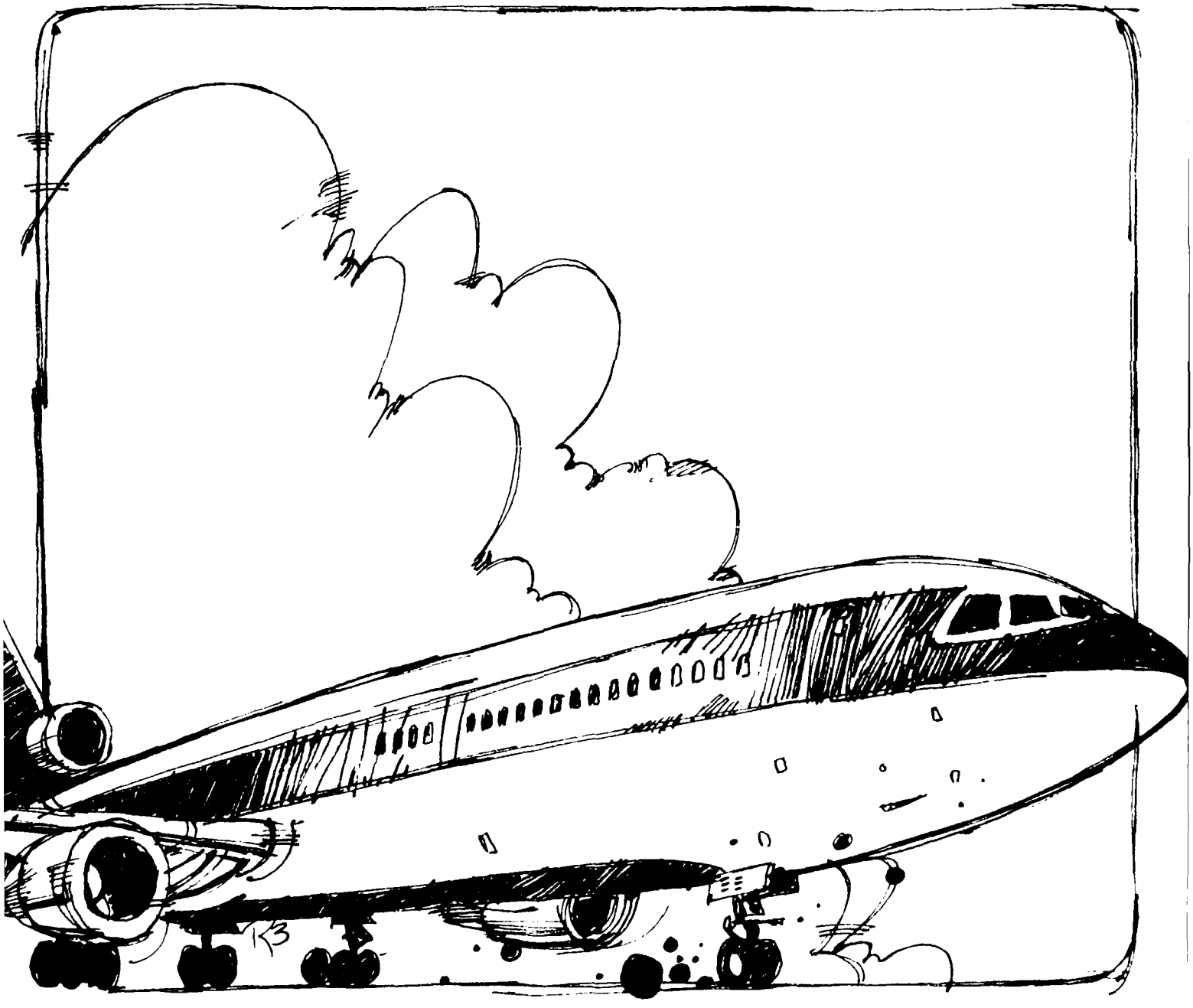
BY SEX



SOURCE: AIR TRANSPORT ASSOCIATION 1989 AIR TRAVEL SURVEY

CHAPTER III

COMMERCIAL AIR CARRIERS



CHAPTER III

COMMERCIAL AIR CARRIERS

At the end of fiscal year 1990, there were 64 U.S. commercial airlines (both scheduled and charter) reporting traffic and financial data to the Research and Special Programs Administration (RSPA), Department of Transportation (DOT), on Form 41. These include 44 passenger airlines (operating aircraft with over 60 seats) and 20 all-cargo carriers. Thirty-one of the passenger airlines provide scheduled service and provide the data base for the air carrier forecasts discussed in this chapter.

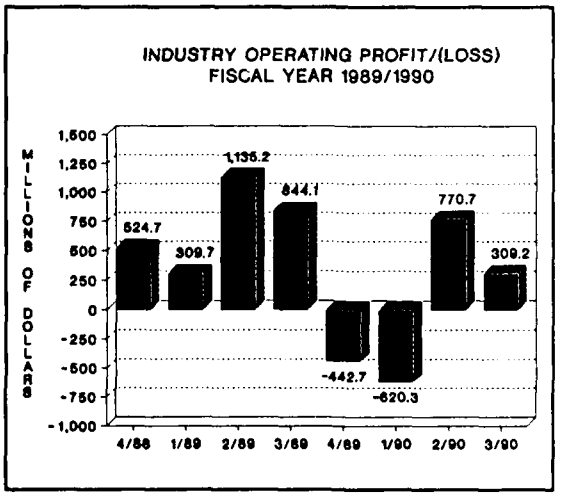
Air carrier traffic forecasts and assumptions are shown numerically in Chapter X (Tables 6 through 17). Air carrier workload forecasts are discussed in Chapter VII and shown numerically in Chapter X (Tables 27 through 33).

A list of active and inactive commercial passenger and cargo air carriers may be found in Appendices A and B, beginning on page 229.

REVIEW OF 1990

FINANCIAL RESULTS

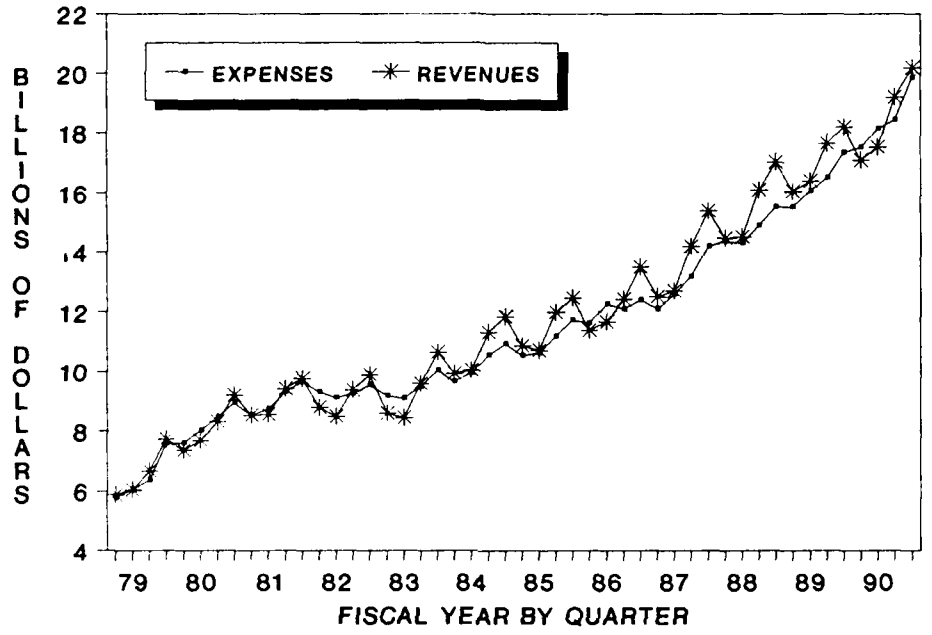
By all accounts, fiscal year 1990 could have been a financial disaster for the U.S. commercial airline industry. First, U.S. economic growth, as measured by real GNP, slowed to just over one percent. Then on August 2, Iraqi forces invaded Kuwait, sending United States and world oil prices skyrocketing (from $17/barrel in July to $40/barrel in September). Despite dire predictions of financial gloom and doom for the peak summer travel period (July-September), U.S. air carriers reported profits of $309.2 million during



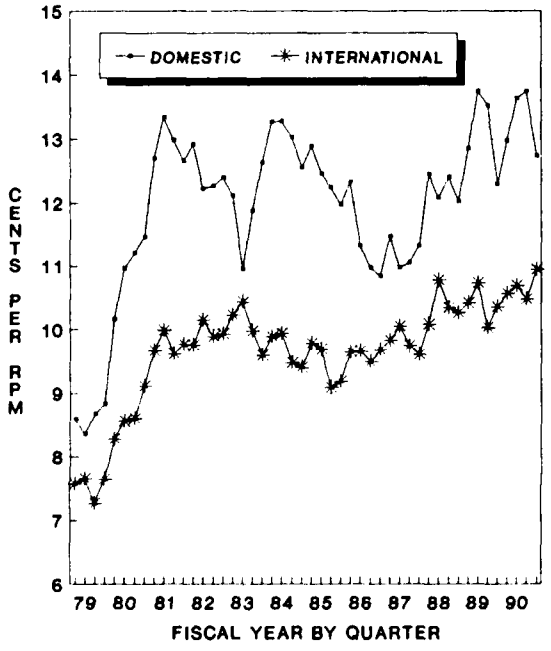
the quarter. This allowed the industry to overcome its sluggish financial performance ($1.1 billion loss) during the first half of the year and to post an operating profit of $16.9 million in fiscal year 1990. Unfortunately, the 1990 financial results represent a deterioration of almost $2.8 billion from the profits earned in 1989. Additionally, the loss posted in the first quarter of fiscal 1990 (October to De-

U.S. AIR CARRIER REVENUE AND COST TRENDS

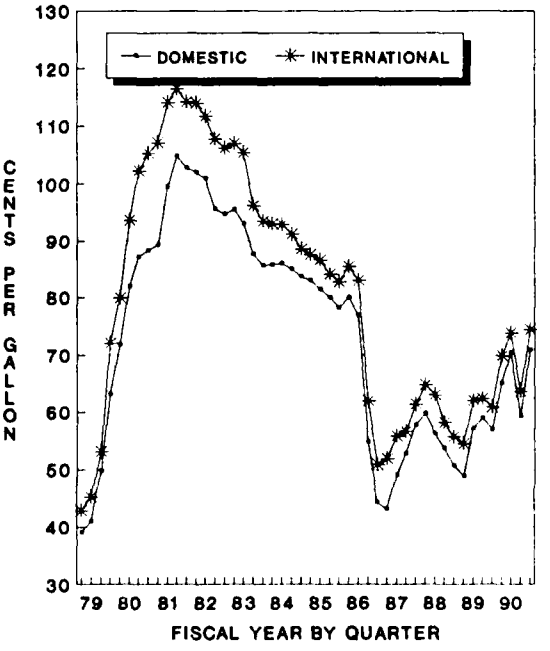
OPERATING REVENUES AND EXPENSES



PASSENGER YIELDS



JET FUEL PRICES



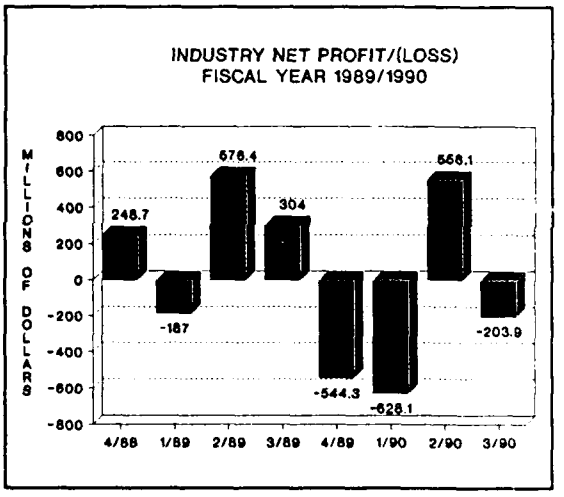
cember) broke a string of 14 consecutive profitable quarters. Even though 1990 was not highly profitable, the U.S. commercial air carrier industry has now recorded an operating profit in each of the last seven years, a period during which industry operating profits have totaled almost $13.2 billion.

The two factors mentioned above, the slowing of U.S. and world economies (up 1.3 and 2.3 percent, respectively) and the rapid increases in the price of jet fuel (from $0.56 per gallon in July to over $1.00 per gallon in late September), are largely responsible for the financial deterioration in fiscal year 1990. Of the two, the increase in the price of jet fuel has a more measurable in determining its impact on the industry's financial position. It is estimated that higher jet fuel prices increased U.S. air carrier operating costs by more than $1.8 billion in 1990, certainly one of the major contributors to the 13.0 percent increase in industry system operating expenses in 1990.

Surprisingly, it was the domestic air travel sector which showed a profit ($341.6 million) in fiscal year 1990. In 1990, the demand for domestic air travel (revenue passenger miles [RPM's]) remained sluggish for the third consecutive year (up only 3.2 percent in 1990 and only 5.3 percent since 1987). In addition, passenger yields (as measured by revenue received per passenger mile) increased by only 1.5 percent. The combination of the two (traffic and yield growth) resulted in an increase in operating revenues of only 8.4 percent, considerably less than the 10.8 percent increase in domestic operating expenses.

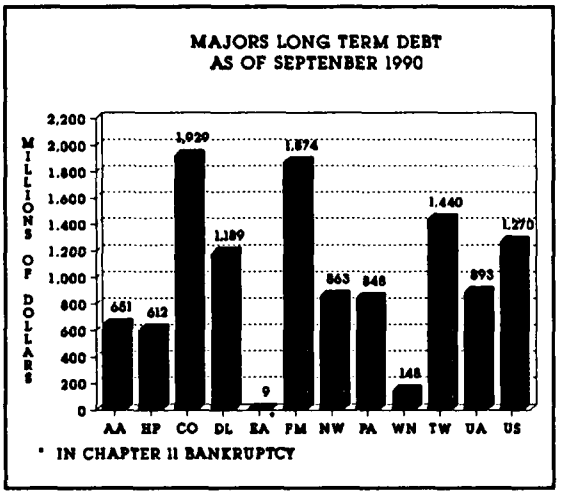
On the other hand, the international air travel sector showed an operating loss of $324.7 million in fiscal year 1990. The international sector recorded its fourth consecutive year of double-digit passenger growth in 1990, with RPM's up 14.3 percent. This, combined with a 3.1 percent increase in international passenger yields, led to a 16.5 percent increase in international revenues. Unfortunately, operating expenses (up 20.9 percent) increased even faster. One possible explanation for the poor financial performance in the international sector is the large start-up and promotional costs associated with the establishment of new international markets/services, with fares not being high enough to cover the cost of providing the service.

U.S. airlines posted a net loss of $820.2 million in fiscal year 1990, a considerable deterioration from the $942.2 million net profit earned in



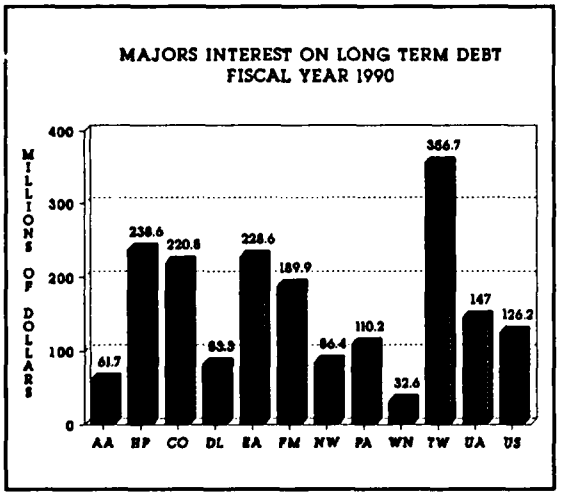
1989. Despite combined net profits of almost 2.1 billion in 1988 and 1989, industry net profits have totaled only $3.4 billion over the last seven years, $9.8 billion less than the operating profits posted during the same time period.

Much of the difference between the industry's operating and net profits can be attributed to the interest that must be paid, in good times or in bad, on the industry's considerable long-term debt. At the end of fiscal year 1990, the industry's long-term debt totaled almost $13.2 billion. This represents a 14.6 percent increase over 1989 ($11.5 billion) and is almost triple the amount of long-term debt



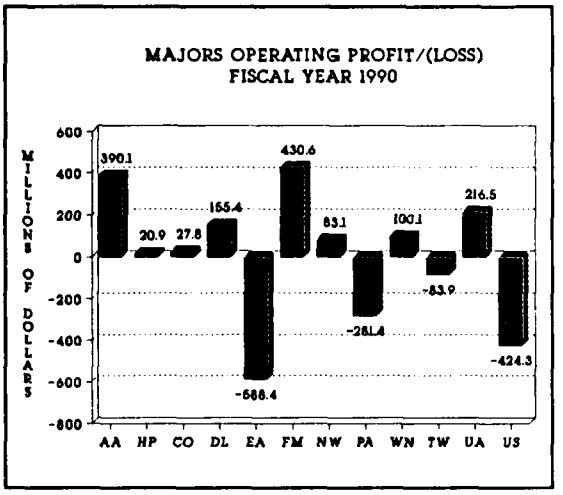
held prior to the start of deregulation ($4.5 billion in the third quarter of 1978).

In 1990, it cost U.S. commercial air carriers almost $2.1 billion to service the interest on its long-term debt. Over the past 6 years, interest payments on the industry's long-term debt have totaled over $12.4 billion,



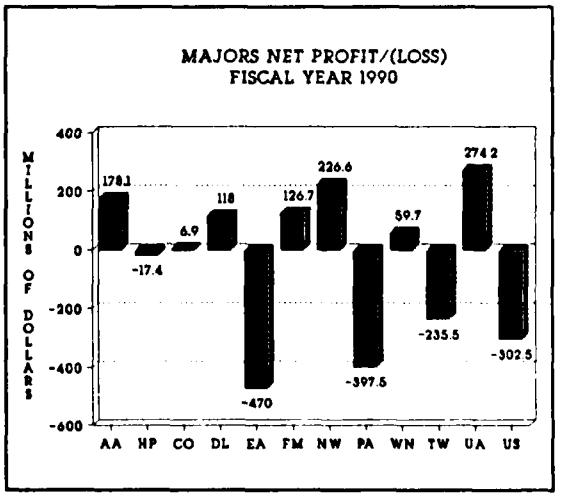
$2.6 billion more than the difference between the industry's operating profit and net profit levels over this time period.

Just as there is considerable disparity among individual carriers with respect to their long-term debt and annual interest payments, the difference among individual carrier financial results is even more pronounced. Although the financial results of most carriers deteriorated in 1990, the disparity among the individual carriers deteriorated even further. The financially strong carriers in 1989 (American [AA], Delta [DL], Federal Express [FM] and



United [UA]) reported combined operating profits totaling almost $1.2 billion in fiscal year 1990, down from profits of $2.7 billion the previous year.

At the other end of the scale, three carriers (Eastern [EA], Pan American [PA] and USAir [US]) reported combined operating losses totaling almost $1.3 billion in fiscal year 1990. In total, 14 carriers reported operating losses in fiscal year 1990, the cumulative sum of these losses totaling over $1.6 billion.



With respect to net profit, five carriers (AA, DL, FM, Northwest [NW] and UA) led all airlines with combined net profits totaling almost $924 million. At the other extreme, four carriers (EA, PA, Trans World [TW] and US) posted a combined net loss of over $1.4 billion.

The industry's strong traffic growth during the 1984-87 period (RPM's up 44.3 percent), combined with strong U.S. economic growth (up 10.1 percent) and declining jet fuel prices (down 39.7 percent), eased the pressure on those carriers with weak balance sheets. At the same time, these same factors also tended to mask the seriousness of the industry's long-term debt problem.

However, slower traffic growth over the past three years, the recent rapid escalation of jet fuel prices, and the highly publicized financial plight of several carriers (Eastern [March 1989], Continental [December 1990], and Pan American [January 1991]--all in Chapter 11 bankruptcy) has served to heighten public awareness of the financial viability of some of the more heavily leveraged airlines. The current forecast portends a significant downturn in both U.S. economic growth and traffic demand in fiscal year 1991. Should the U.S. economic recession be more severe or be longer in duration than now expected (two quarters), several of the more highly leveraged carriers could be forced into Chapter 11 bankruptcy. Indeed, the financial viability of the commercial air carrier industry, in general, could be called into question.

Generally, it has been the financially weaker carriers who establish discount fare policy within the industry. Much of the time the goal is merely to generate cash flow, often without any regard to the profitability of such fares. This forecast assumes that there will not be a major, uneconomical fare war in 1991. However, the forecast does assume the heavy discounting of fares in both 1991 and 1992 to fill otherwise empty seats. While most U.S. carriers appear to have a firm grasp on fares at the current time, a prolonged fare war, especially in light of considerably higher fuel costs, could seriously erode industry profits and have possible serious consequences for both the industry and the traveling public. Such a scenario could result in additional bankruptcies and/or mergers. This, in turn, could result in the consolidation of market power among a few large carriers--a situation in which there would be few winners and many losers, most notably the traveling public.

SCHEDULED PASSENGER TRAFFIC AND CAPACITY

Scheduled system (domestic and international) passenger traffic on U.S. commercial airlines increased for the ninth consecutive year in 1990. Over this nine-year period (1982 to 1990), system RPM's and enplanements increased by 82.9 and 62.8 percent (an average of 6.9 and 5.6 percent per year), respectively. In fiscal year 1990, system RPM's (454.1 billion) increased by 5.8 percent and passenger enplanements (465.2 million) grew by 2.8 percent.

The growth in passenger demand in 1990 was considerably stronger than expected, given the sluggish growth of the U.S. economy (real GNP up only 1.3 percent). However, some of the increase (less than 1.0 percent) is due to the fact that 1989 traffic was abnormally depressed by the Eastern Air Lines' strike (beginning March 4, 1989) and subsequent Chapter 11 bankruptcy.

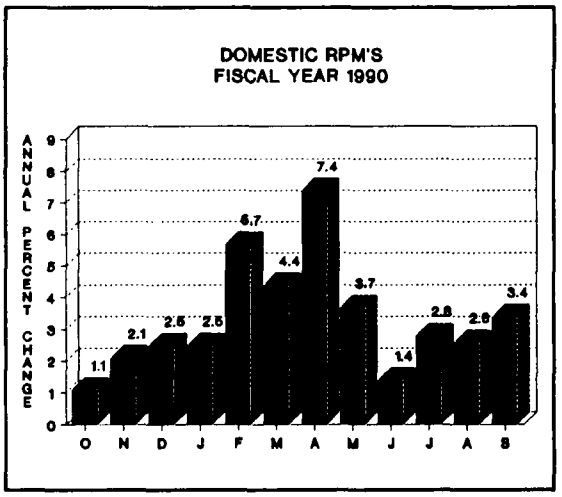
Available seat miles (ASM's) totaled 723.6 billion in fiscal year 1990, an increase of 6.3 percent over 1989. Part of the capacity growth in 1990 is also due to the fact that the Eastern Air Lines' strike distorted system ca-

pacity (approximately 2.6 percent) in 1989.

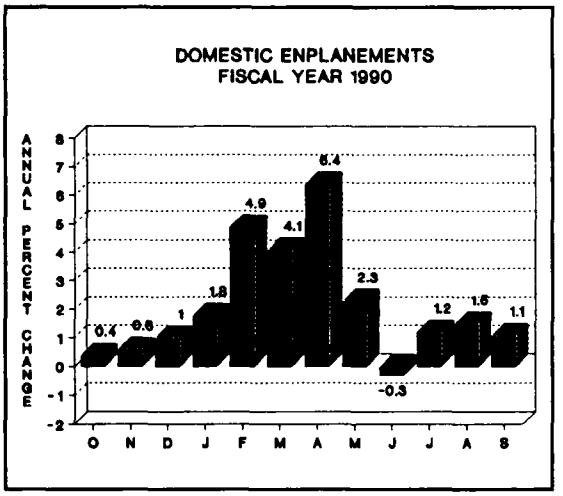
Over the past nine years, system ASM's have grown by 71.1 percent, an average annual increase of 6.2 percent. During this same period, the system load factor increased from 58.7 percent in 1981 to 62.8 percent in fiscal year 1990, only slightly below the record levels of 63.2 and 63.0 percent achieved in fiscal years 1979 and 1989, respectively.

Domestic Passenger Traffic and Capacity

Following three consecutive years of strong domestic traffic growth (RPM's up 35.5 percent between 1984 and 1987), the demand for air travel within the United States has increased by only 5.3 percent over the past three years. Domestic RPM's (339.1 billion) grew by 3.2 percent in fiscal year 1990 after having grown by a combined 2.0 percent over the previous two years.



The growth in domestic passenger enplanements (424.0 million) has been considerably less than that for RPM's, increasing by only 2.1 percent since 1987; down 0.3 percent in 1988, up 0.4 percent in 1989, and up 2.0 percent in 1990.



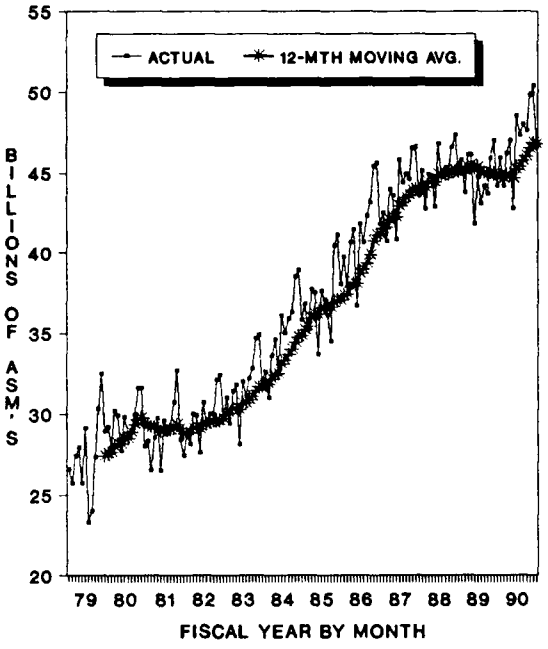
Higher fares (nominal domestic yields up 18.3 percent since 1987) are one of the main causes for the sluggish growth in domestic passenger demand since 1987. Starting in June 1987, U.S. airlines began to institute a series of fuel surcharges and across-the-board fare increases. At the same time, more restrictions and longer advance purchase requirements were placed on the use of discount fares. These higher fare levels held throughout most of 1988 and 1989 before moderating somewhat during the first half of 1990 (up only 0.1 percent). However, the recent run-up in jet fuel prices have led U.S. airlines to institute additional fuel surcharges, the result being a 3.5 percent increase in yields during the fourth quarter of fiscal year 1990 (July to September). Passenger yields were up 1.5 percent for the entire fiscal year.

Domestic capacity (557.3 million ASM's) grew by 5.3 percent in fiscal year 1990 after having declined by 0.7 percent the previous year. However, some of the growth in 1990 was due to the fact that domestic capacity in 1989 (approximately 3.2 percent) was distorted by the strike at Eastern Air Lines.

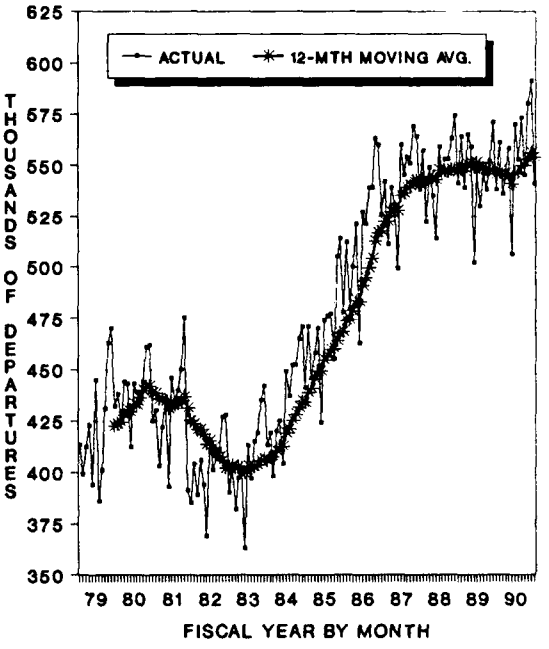
Despite slow growth in traffic over the past three years, domestic load factors (60.8 percent in 1990) have remained at historically high levels (averaging 61.1 percent between 1985 and 1990).

U.S. AIR CARRIER DOMESTIC TRAFFIC TRENDS

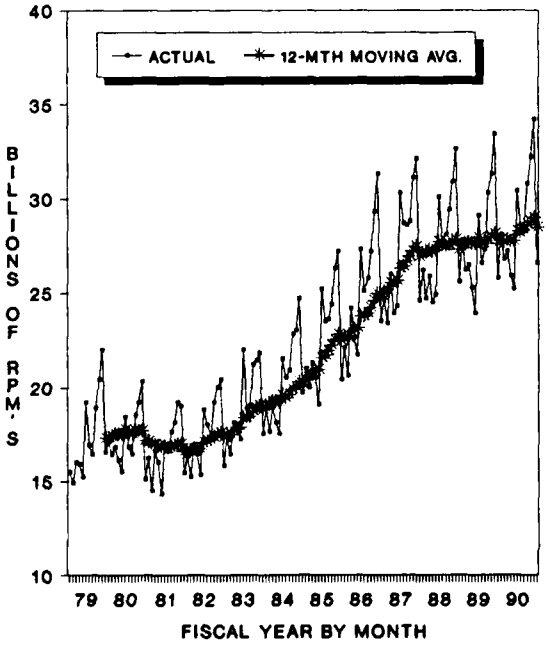
AVAILABLE SEAT MILES



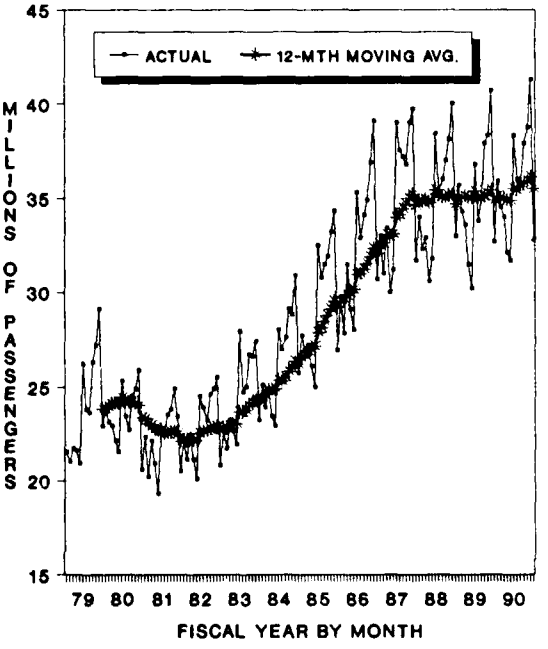
AIRCRAFT DEPARTURES

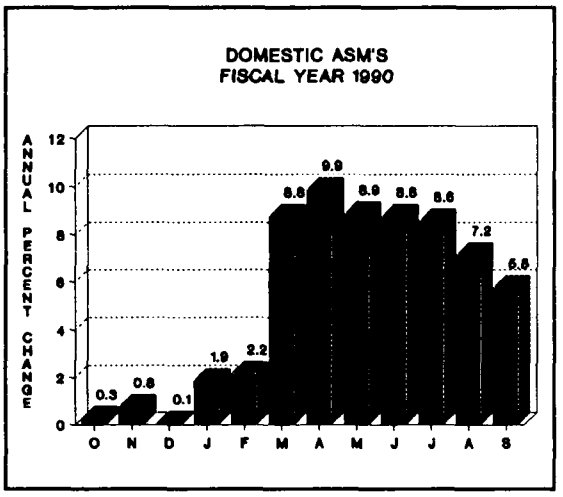


REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS

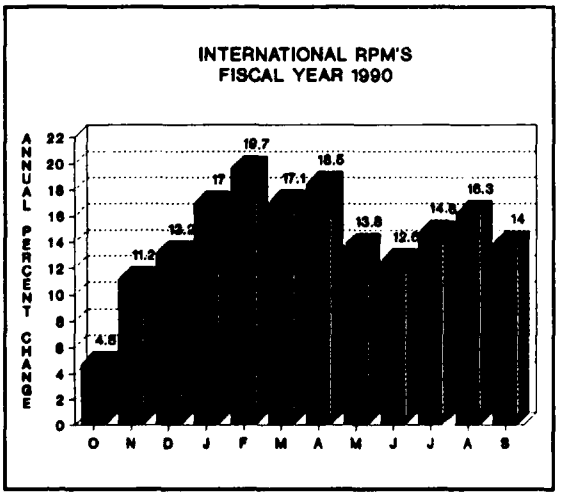




This is due, in large part, to the fact that since 1985, domestic capacity growth (up 27.6 percent) has basically kept pace with traffic demand (up 27.6 percent). The domestic load factor declined 1.2 points in 1990; however, the 1989 load factor was inflated somewhat by the effects of the Eastern Air Lines' strike.

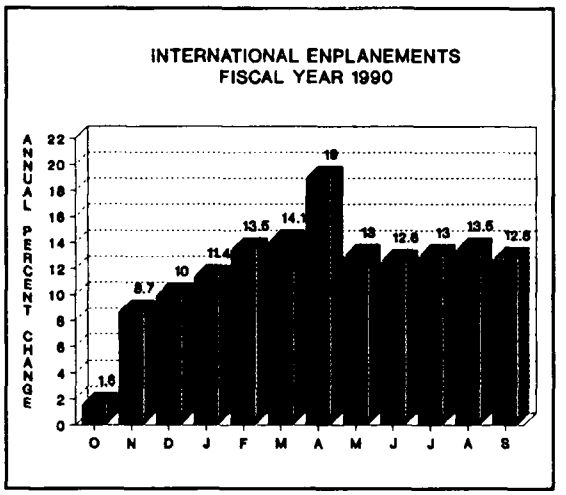
International Passenger Traffic and Capacity

After a disappointing traffic year in fiscal year 1986 (RPM's down 0.7 percent), largely due to terrorist activities abroad, international RPM's and



passenger enplanements have increased by 79.9 and 68.5 percent, respectively, over the past four years. In fiscal year 1990, international RPM's (115.1 billion) were up 14.3 percent and passenger enplanements (41.2 million) grew by 12.0 percent.

International traffic growth in 1990

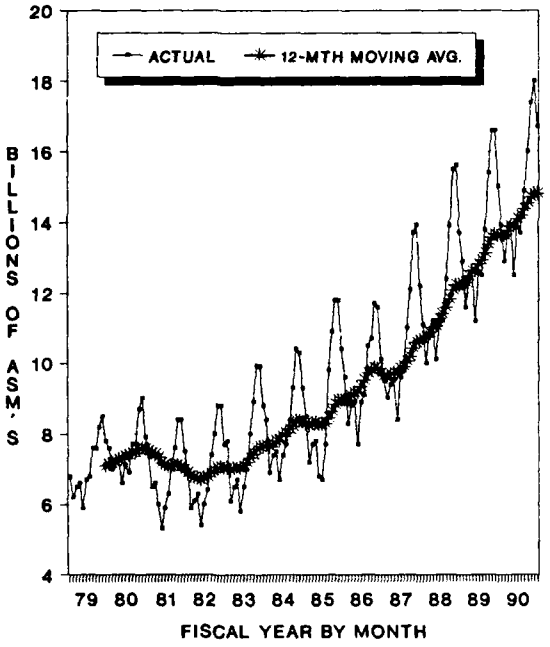


benefitted somewhat by two factors that had led to slower than the average growth the previous year. First, the midair destruction of Pan American flight 103 by terrorists in December 1988 reduced U.S. flag carrier traffic between the United States and European destinations during the early months of calendar year 1989. Second, the Eastern Air Lines' strike (beginning March 1989) distorted U.S. carrier capacity and traffic between the United States and many South American destinations. Conversely, these two factors have led to abnormally higher growth patterns during the affected months in 1990.

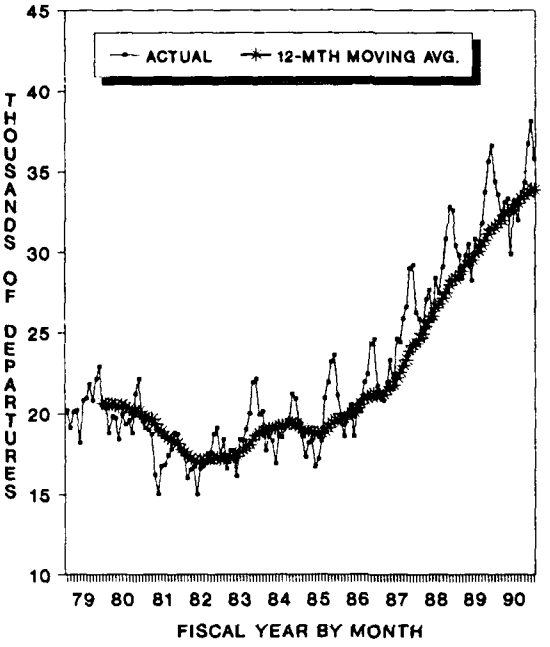
A large part of the growth in the demand for international travel continues to be the large increase in international schedules. International seat miles (166.3 billion) increased by 10.1 percent in fiscal year 1990, this following increases of 15.3 and 11.6 percent in 1988 and 1989, respectively. With the exception of Latin America, the Eastern Airlines' strike is thought to have had only minimal impact (less than 1.0 percent) on over-

U.S. AIR CARRIER INTERNATIONAL TRAFFIC TRENDS

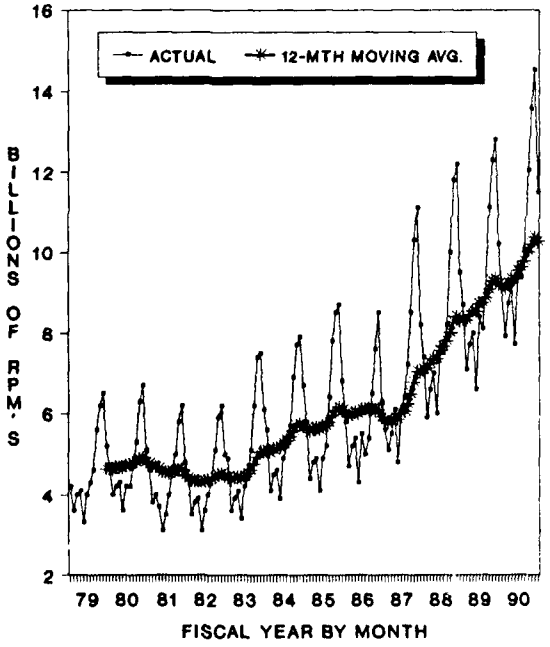
AVAILABLE SEAT MILES



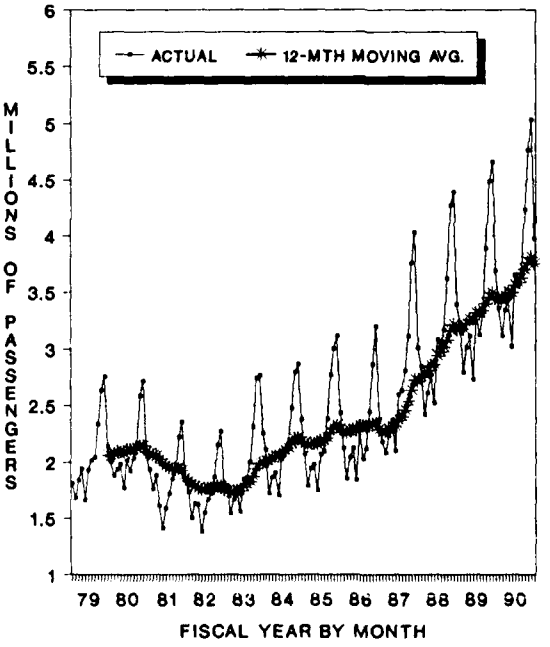
AIRCRAFT DEPARTURES

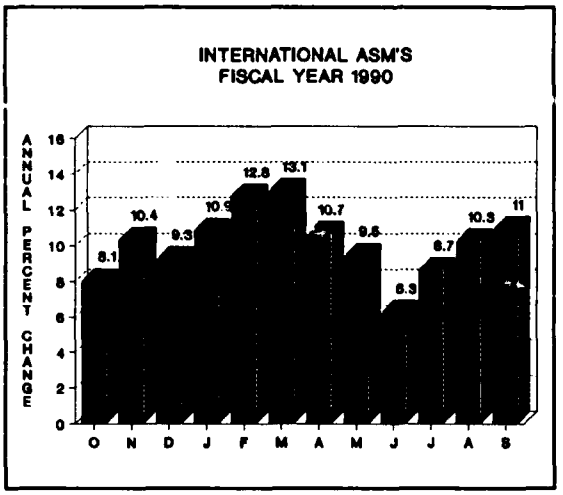


REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



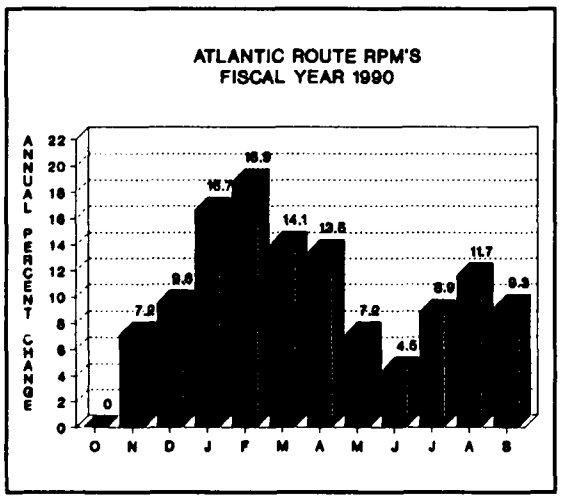


all international capacity in 1989.

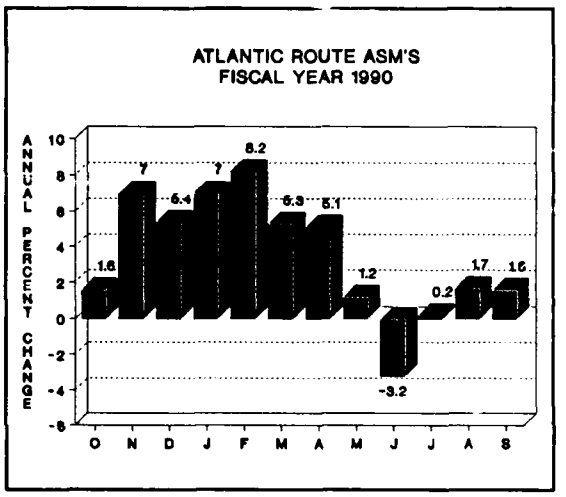
Despite the relatively large increases in international capacity since 1983, international load factors have, with the exception of 1986, remained consistently in the mid-60's. The 1990 international load factor (69.2 percent) was 2.6 points higher than the 1989 load factor and is the highest ever recorded for international travel. (The previous high was 66.9 percent in 1988).

Atlantic Routes

Transatlantic RPM's (53.7 billion) and enplanements (16.1 million) increased by 9.4 and 7.1 percent, respectively, in fiscal year 1990. Despite the relative strong traffic growth, it is almost a third less than the average growth (RPM's and enplanements up 13.3 and 11.2 percent, respectively) achieved since 1986. In addition, traffic in 1990 benefitted from the fact that 1989 traffic was depressed by terrorist activities.



The slower traffic growth in 1990 is also due, in part, to the fact that capacity increases on the transatlantic

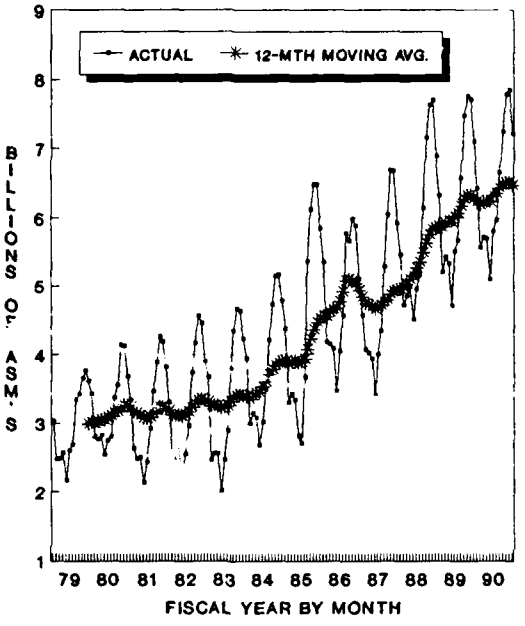


routes slowed considerably in fiscal year 1990, with ASM's (77.0 billion) increasing by only 2.9 percent. In fact, during the four-month peak summer travel period (June to September), transatlantic capacity was up less than 0.1 percent over the same 1989 period. In addition, the average load factor for this four-month period was 78.9 percent. Although quite profitable, a load factor approaching 80 percent could possibly mean that some traffic is being turned away on peak travel days.

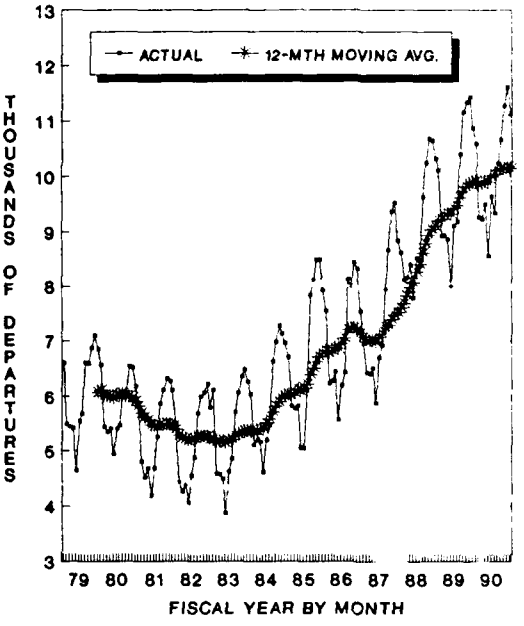
However, the current capacity problem appears to be limited almost exclusively to the two major carriers on the transatlantic routes, Pan American and Trans World, whose combined capacity on these routes increased only 0.1 percent in 1990, down 4.7 percent during the four-month peak summer period. These two carriers, which together accounted for 62.6 percent of the transatlantic capacity in 1990 (down from 64.3 per-

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - ATLANTIC ROUTES

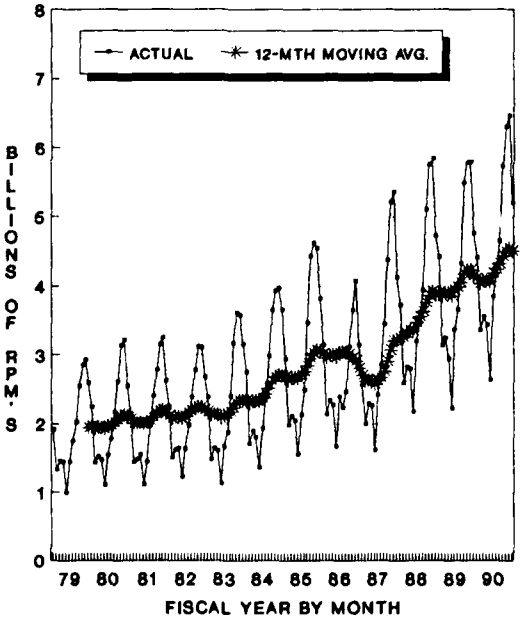
AVAILABLE SEAT MILES



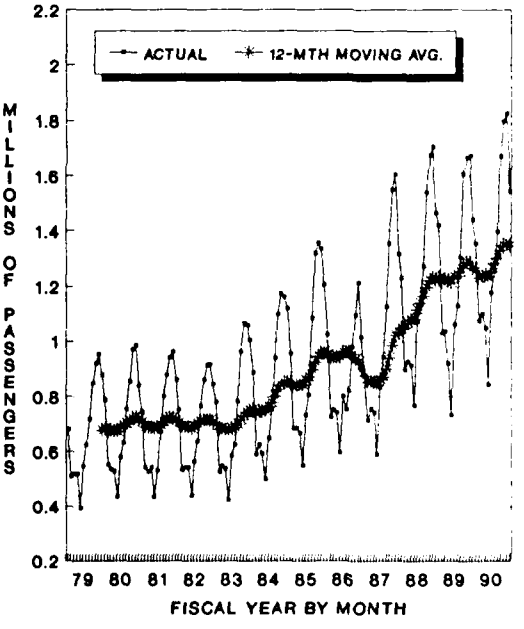
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

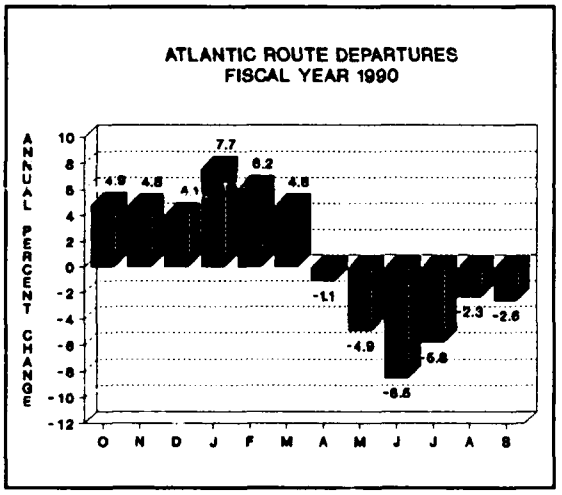


PASSENGER ENPLANEMENTS



cent in 1989) appear to have neither the financial resources nor the aircraft capacity on order to expand in these markets. In fact, Pan American recently sold its intra-Germany routes to Lufthansa and has agreed, in principle, to sell its United States-London Heathrow route authority to United Airlines. Trans World, in turn, has also agreed to sell its United States-London Heathrow route authority to American Airlines.

For the first time since 1986, the number of departures (as reported to RSPA on Form 41) between the United States and Atlantic route destinations, failed to out pace the growth in ASM's, increasing by only 0.1 percent in fiscal



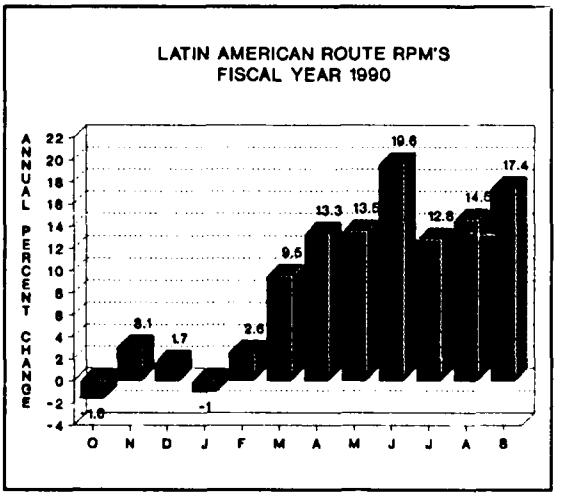
year 1990. Over the previous four years, the larger percentage increase in departures relative to seat miles (54.0 percent versus 30.0 percent) had signified a continuation of the trend toward the increased use of the smaller seat capacity widebody twins (B-767 and A-310 aircraft) on the transatlantic routes, a trend that continued unabated in 1990.

Possible reasons for the decline in departures on transatlantic routes are a reduction in the number of continuation flights in Europe and a reliance on more connecting service (counted as domestic), as opposed to through flights, within the United States. An analyses of the Official Airline Guide (OAG) indicates that the number of nonstop departures (gateway-to-gateway) across the North Atlantic continued to increase throughout fiscal year 1990, thus lending some rationale to the reasons discussed above.

U.S. air carriers achieved an annual load factor of 69.8 percent on the Atlantic routes in fiscal year 1990, beating the previous all-time high load factor of 69.0 percent recorded in 1984.

Latin American Routes

Traffic demand to Latin American destinations (South America, Central America, Mexico, and the Caribbean) has, with the exception of 1989, shown considerable strength. Since 1985, Latin American RPM's and enplanements have increased by an average 10.6 and 10.4 percent, respectively. Traffic demand in this sector remained strong



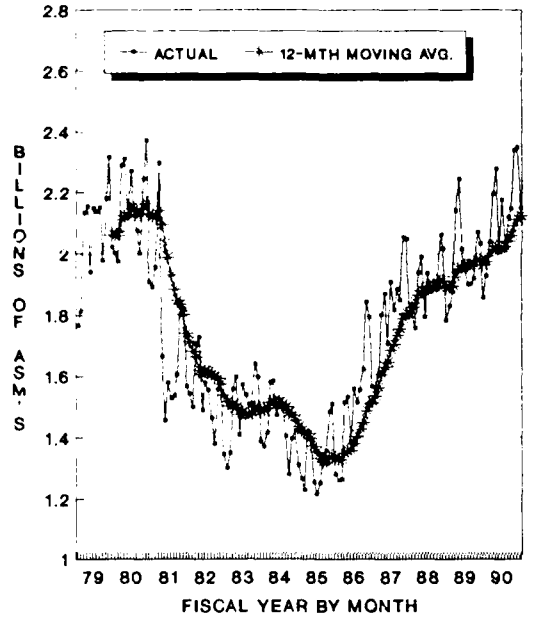
in fiscal year 1990, with RPM's (16.0 billion) and enplanements (12.9 million) growing by 8.7 and 9.7 percent, respectively.

Some of the growth in 1990, however, is due to the fact that the Eastern Air Lines' strike (beginning March 1989) distorted traffic in 1989, resulting in seemingly high traffic growth in 1990. The impact of the Eastern strike in

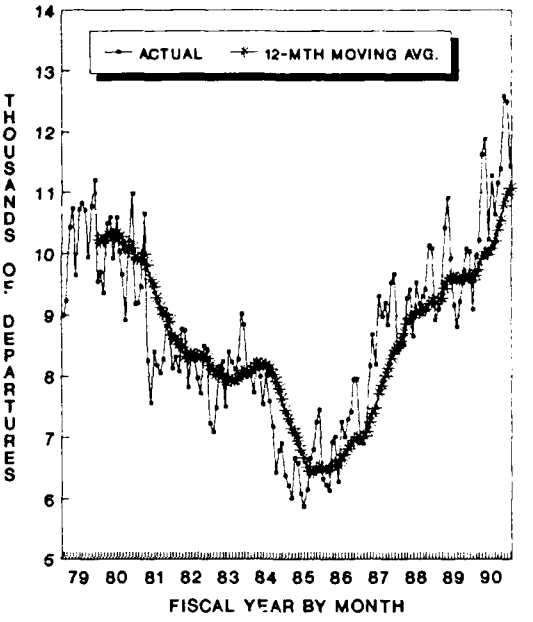
U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS

INTERNATIONAL OPERATIONS - LATIN AMERICA ROUTES

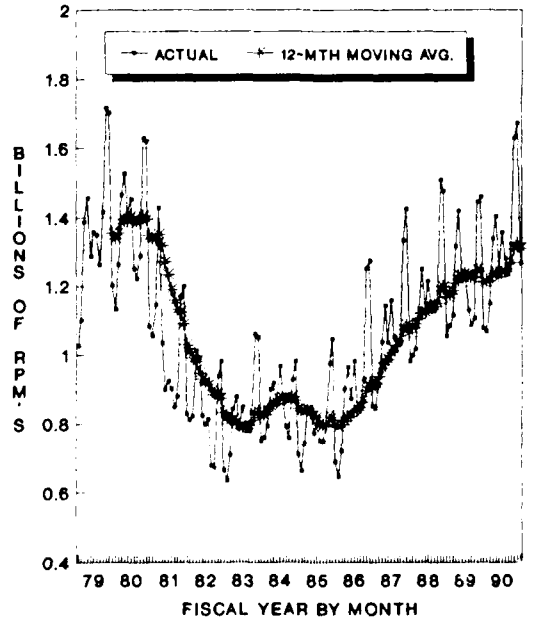
AVAILABLE SEAT MILES



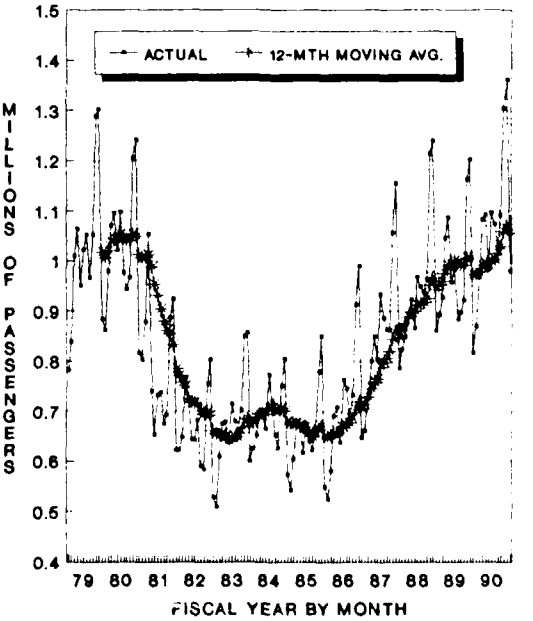
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

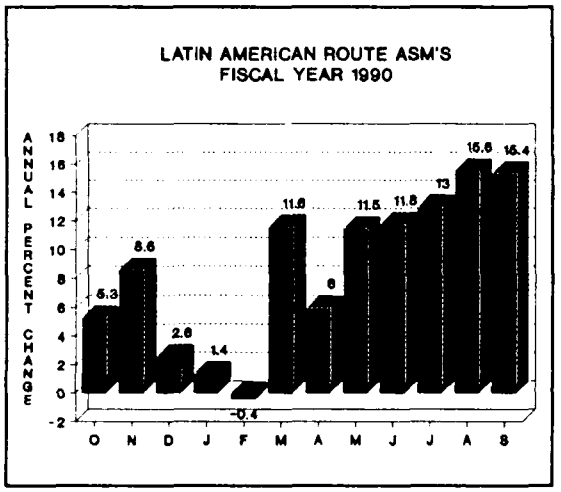


PASSENGER ENPLANEMENTS



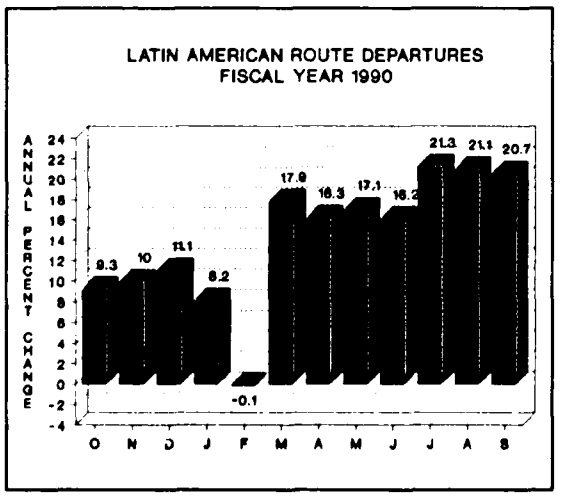
both 1989 and 1990 is evident from the fact that during the seven-month period (March to September) immediately following the strike, Latin American RPM's and enplanements declined by 1.7 and 3.7 percent, respectively. During the same 1990 period, RPM's and enplanements increased by 14.3 and 15.4 percent, respectively.

Latin American ASM's (25.7 billion) grew by 8.4 percent in fiscal year 1990. However, capacity on Latin



America routes in 1989 was distorted by the strike at Eastern Air Lines (approximately 5.0 percent), thus inflating the growth that occurred in 1990 (up 12.1 percent during the March to September period).

The number of aircraft departures be-

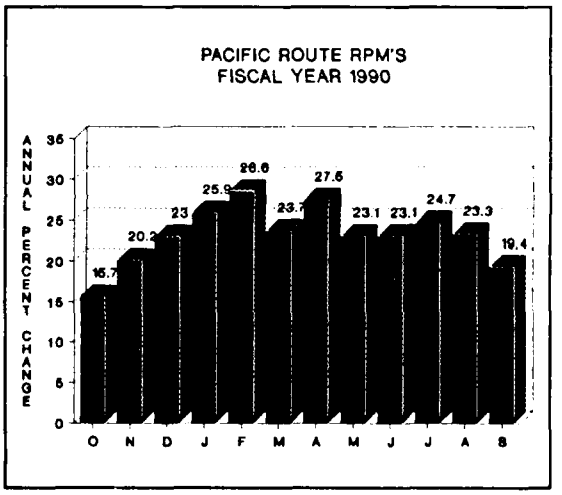


tween the United States and Latin American destinations increased by 14.1 percent in 1990. The higher percentage growth in departures relative to ASM's reflects the greater use of smaller aircraft on these routes.

Latin American load factors increased only slightly in fiscal year 1990, averaging 62.0 percent. This represents an increase of 0.1 point over the 1989 load factor.

Pacific Routes

The Pacific area continues to be the fastest expanding of the three international travel regions. Passenger



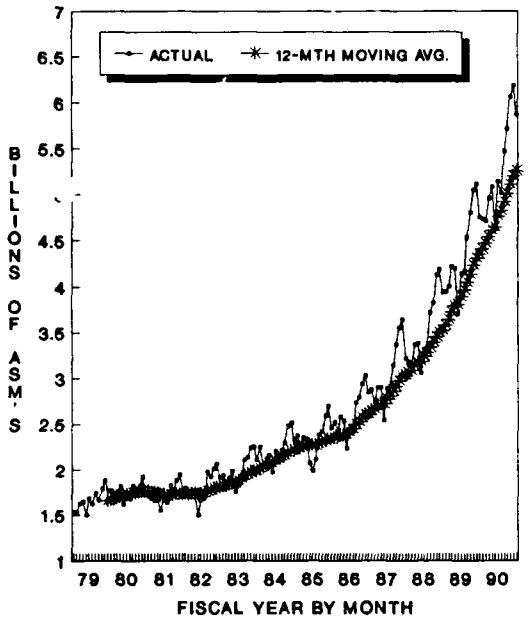
traffic to Pacific destinations increased for the ninth consecutive year in 1990. Over this nine-year period, RPM's and passenger enplanements have more than tripled, growing at average annual rates of 15.2 and 15.5 percent, respectively.

Moreover, demand to Pacific destinations shows no signs of slowing down. Since 1986, RPM's and enplanements have both increased by better than 22.0 percent annually. In fiscal year 1990, Pacific route RPM's (45.4 billion) were up 23.2 percent and enplanements (12.2 million) grew by 22.0 percent.

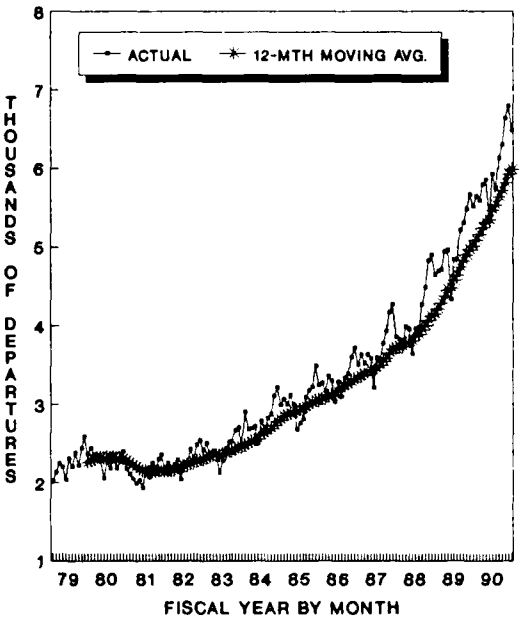
Capacity on transpacific routes has

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - PACIFIC ROUTES

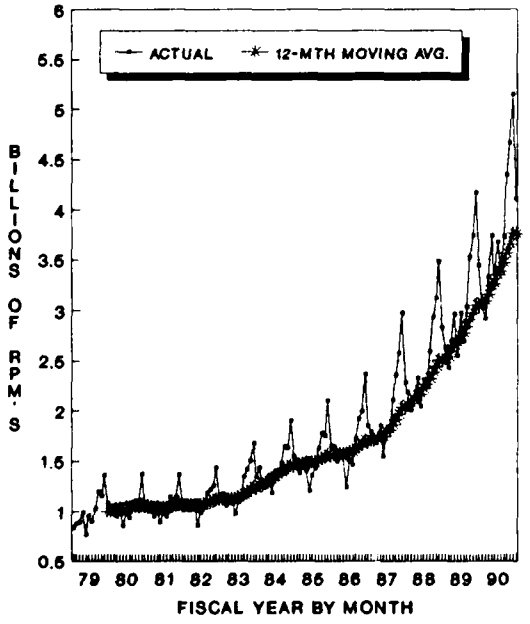
AVAILABLE SEAT MILES



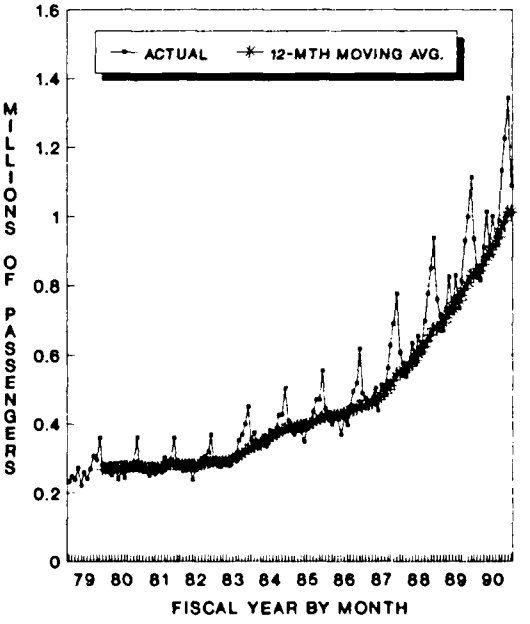
AIRCRAFT DEPARTURES

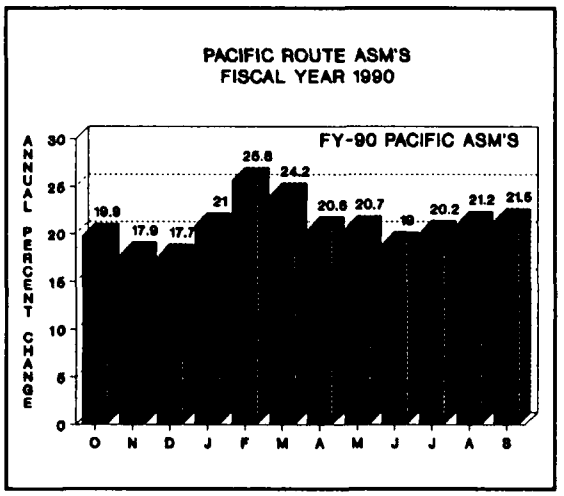


REVENUE PASSENGER MILES



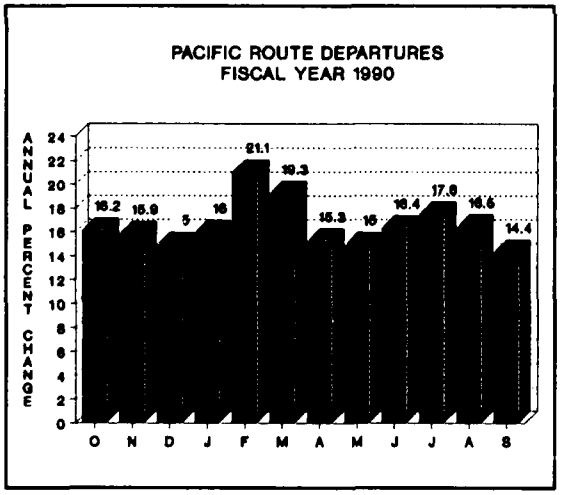
PASSENGER ENPLANEMENTS





more than doubled during the past four years, averaging almost 19.2 percent annually over this time period. In fiscal year 1990, transpacific ASM's (63.6 billion) grew by 20.9 percent.

The number of aircraft departures between the United States and Pacific destinations grew by 16.7 percent in



1990. This slower growth in departures relative to ASM's reflects the increased utilization of larger capacity aircraft on the transpacific routes.

Despite the large increases in capacity over the past several years, load factors on transpacific routes have remained at relatively high levels. In fiscal year 1990, the load factor was 71.4 percent, the highest ever recorded in transpacific service. This is 0.4 points higher than the previous record high load factor of 71.0 percent achieved in 1988.

NONSCHEDULED TRAFFIC AND CAPACITY

The number of nonscheduled (charter) passengers flying on U.S. commercial air carriers declined by 5.0 percent in fiscal year 1990, to a total of 9.0 million. Domestic enplanements (5.1 million) increased by 5.3 percent, while international enplanements (3.9 million) declined by 15.9 percent.

Nonscheduled RPM's declined by 6.0 percent in fiscal year 1990, to a total of 13.7 billion. Domestic passenger miles (5.5 billion) were up 7.4 percent while international passenger miles (8.2 billion) declined by 13.3 percent. Nonscheduled U.S. air carriers continued to lose share in international markets during fiscal year 1990. This was due, in large part, to the increased number of international gateways and the diversity of geographic locations now served by the scheduled air carriers.

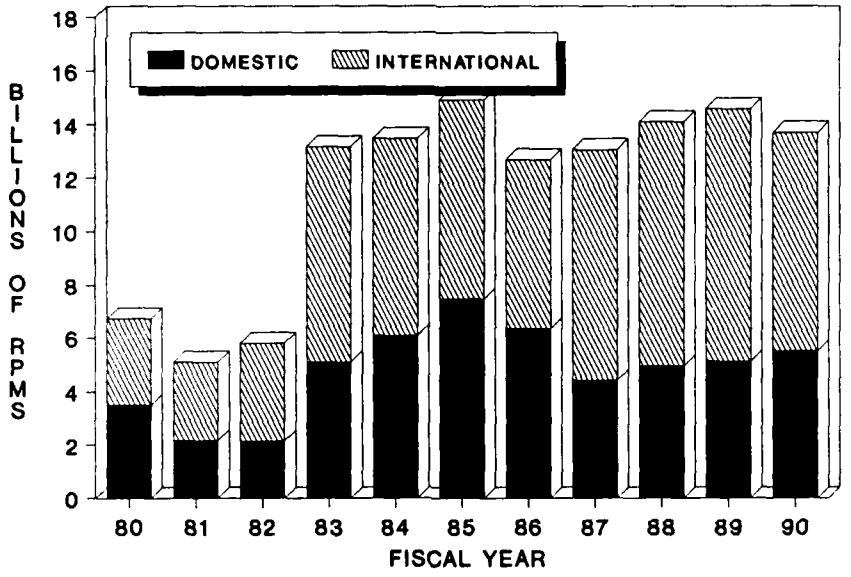
Nonscheduled capacity (18.6 billion ASM's) declined by 2.2 percent in fiscal year 1990. Domestic seat miles (7.3 billion) were up 6.3 percent, while international seat miles (11.3 billion) were down 7.0 percent.

Nonscheduled load factors averaged 73.6 percent in fiscal year 1990, down 3.0 points from 1989. Domestic load factors averaged 75.5 percent (up 0.8 points), while international load factors averaged 72.4 percent (down 5.2 points).

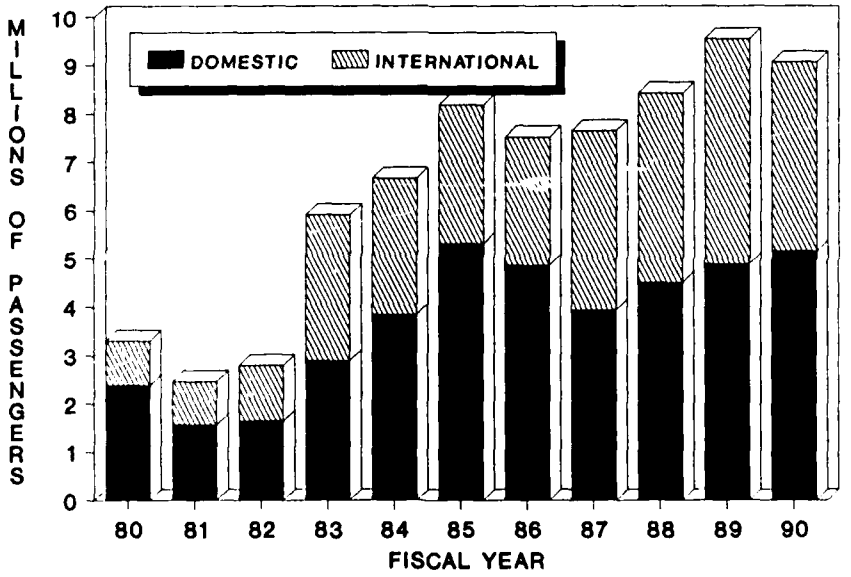
Historical (1980-1990) nonscheduled traffic (RPM's and enplanements), capacity (ASM's), and load factor statistics may be found in Appendix C, beginning on page 237.

U.S. COMMERCIAL AIR CARRIERS
NONSCHEDULED TRAFFIC

REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



AIR CARGO TRAFFIC

Air cargo revenue ton miles (RTM's) flown by U.S. air carriers reporting on RSPA Form 41 totaled 16.2 billion in fiscal year 1990, an increase of only 0.5 percent over statistics published for 1989. This included an increase of 0.3 percent in system freight/express RTM's (14.2 billion) and an increase of 2.1 percent in mail RTM's (2.0 billion).

Domestic freight/express RTM's (7.4 billion) remained flat in fiscal year 1990 while international freight/express RPM's (6.8 billion) grew by 0.6 percent.

In previous years, the reporting of new first-time carrier data (Federal Express in 1986 and United Parcel in 1988) has significantly inflated cargo statistic growth rates as reported by RSPA in those years. Emery Worldwide began reporting freight RTM's (5.5 million international RTM's in 1990) data to RSPA for the first time in January 1990. This, however, inflated the growth in 1990 only marginally.

Domestic mail RTM's (1.5 billion) increased by 0.8 percent and international mail RTM's (0.5 billion) grew by 5.8 percent in fiscal year 1990.

Historical (1980-1990) domestic and international air cargo statistics may be found in Appendix D, beginning on page 239.

FORECAST ASSUMPTIONS

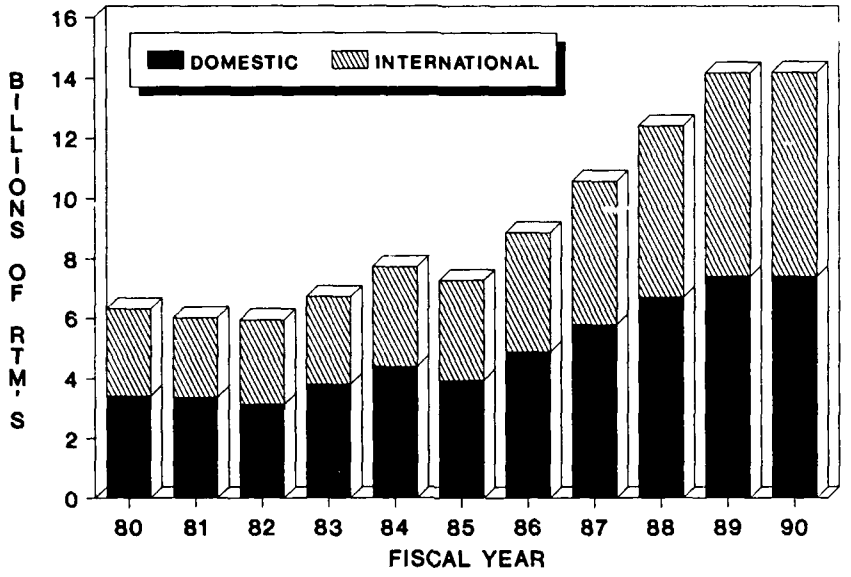
The baseline forecasts of commercial air carrier traffic and activity over the next 12-year period (1991 to 2002) assumes that the industry will continue to be affected by the deregulation process for at least the next several years. Although it is impossible to foresee all the changes that will occur, it is highly likely that the merger/consolidation phase begun in fiscal year 1986 will continue into the early 1990's. The extent of such activity will depend on how long oil prices remain at current high levels and/or whether the downturn in the U.S. economy is more severe or longer lasting than expected. The loss of one or more of the established larger airlines and possibly several of the remaining post-deregulation low-cost, low-fare carriers is very probable under a worse-case scenario.

It is also possible, although not likely under current economic projections, that the industry could witness the emergence of new low-cost airlines seeking to establish a market niche for themselves. This forecast assumes a continuation of the merger/consolidation phase.

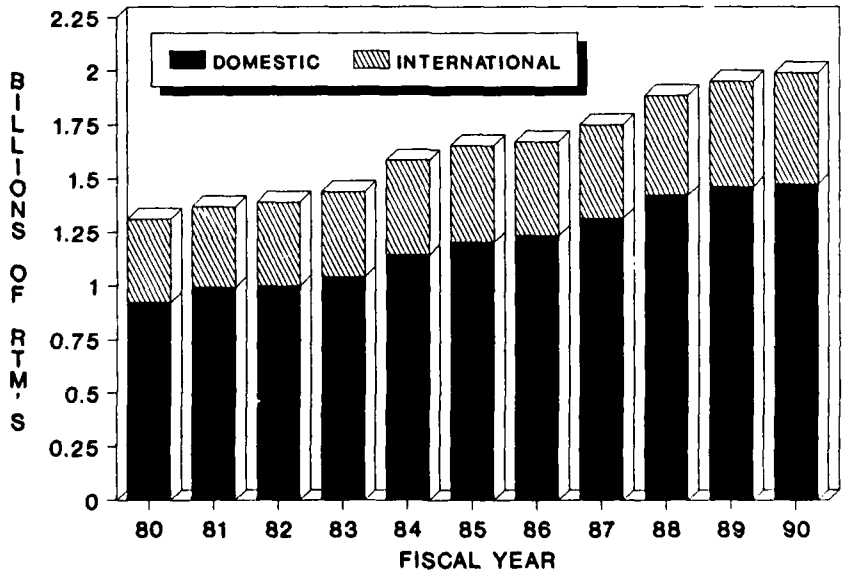
The industry is also expected to continue to experiment with methods to stimulate travel markets, either through the use of innovative discount fares and/or other travel incentives. In the immediate short-term, commercial air carriers are likely to slow the expansion of their present hub systems and/or delay the development of new secondary hubs at medium and small airports. However, the slowdown in hub expansion is expected to be short lived. Because of the large numbers of new aircraft scheduled for delivery during the early to mid-1990's, the hub development/expansion process is likely to resume once the U.S. economy turns upward. Continued hub expansion, however, could increase delays and capacity problems at many of the large U.S. air carrier airports. Additional delay and capacity problems could, in turn, significantly constrain the growth of air carrier traffic in the future.

U.S. COMMERCIAL AIR CARRIERS
AIR CARGO REVENUE TON MILES

FREIGHT/EXPRESS TON MILES



MAIL TON MILES



JET FUEL PRICES

In fiscal year 1990, U.S. commercial air carriers paid an average price of $0.676 per gallon for jet fuel. This represented a nominal increase of 19.9 percent and a real increase ($1982-84) of 15.4 percent. However, the average price, in this case, is somewhat misleading since fuel prices actually increased from $0.601 per gallon in September 1989 to $0.908 per gallon in September 1990 ($1.14 per gallon in October 1990), an increase of 50.9 percent, the latter increase is the result of the large run-up in crude oil prices caused by the Iraqi invasion of Kuwait.

Fuel prices have a profound effect on the profitability of U.S. airlines, depending on whether the trend in prices is generally downward (as occurred between June 1981 and November 1986) or upward (November 1988 to September 1990). The 19.9 percent increase in jet fuel prices in 1990 is estimated to have increased U.S. air carrier operating expenses by over $1.8 million.

An industry "rule-of-thumb" estimates that a $1.00/barrel increase (or decrease) in the price of crude oil will (1) increase (or decrease) jet fuel prices by 3.6 cents per gallon and (2) increase (or reduce) U.S. airline annual operating costs by $575 million. Based on crude oil prices of $35/barrel, jet fuel prices would be expected to increase to around $1.20 per gallon and result in a $10 billion increase in U.S. air carrier operating costs.

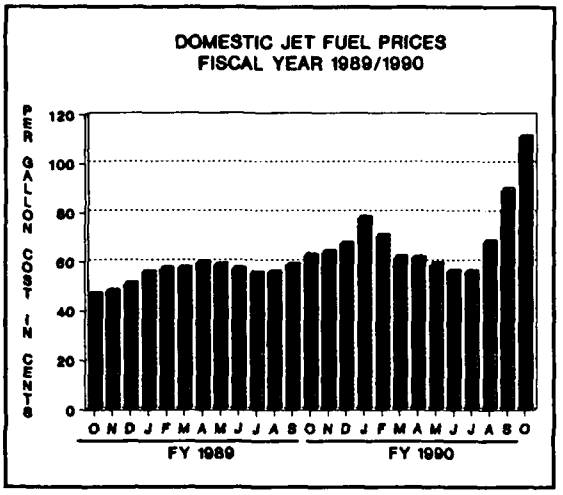
When jet fuel prices reached its peak price during the third quarter of 1981 ($1.088 per gallon), fuel costs accounted for over 31.0 percent of U.S. air carrier operating costs. By the second quarter of 1989, jet fuel costs as a percentage of total operating costs had declined to only 13.7 percent. The recent run-up in oil prices has increased this percentage to only 15.8 percent in the third quarter of 1990 (July to September). Barring any new unforeseen fuel supply disruptions or major new oil discoveries, jet fuel costs as a percent of total operating costs is expected to increase gradually over the forecast period.

Although the price of jet fuel is forecast to increase rapidly in fiscal year 1991 (up 22.0 percent to $0.825 per gallon), the increase over the remainder of the forecast period is considerably more moderate (2.2 percent annually). Nevertheless, jet fuel prices are expected to rise to $1.066 per gallon in fiscal year 2002, just slightly higher than last year's forecast.

After the large increase in 1991, system jet fuel prices are projected to average only $0.591 per gallon (down 28.4 percent) in 1992 and $0.613 per gallon (up 3.7 percent) in 1993. In real terms, system jet fuel prices are forecast to decline at an annual rate of 0.8 percent, from $0.532 per gallon in 1990 to $0.483 per gallon in fiscal year 2002. However, after the large increase in 1990 (up 15.4 percent), the real price of jet fuel is expected to decline sharply in 1992 (down 31.1 percent) and then increase 1.3 percent annually over the next 10 years.

Domestic Jet Fuel Prices

In fiscal year 1990, U.S. airlines paid an average of $0.668 per gallon for domestic jet fuel, 20.6 percent more than the average price paid in 1989. On a month over month basis, however, domestic fuel prices increased by 51.5 percent, from $0.592 per gallon in September 1989 to $0.897 per gallon in September 1990, thus continuing the roller coaster ride that fuel prices have exhibited since the first worldwide energy crisis in 1973.



Starting from a base of just over $0.115 cents a gallon in 1973, the price of jet fuel, aided by two worldwide energy crises, rose to a peak price of $1.052 in May 1981. Over the following five and one-half years (June 1981 to November 1986), the price of domestic jet fuel declined 60.0 percent to $0.422 per gallon. In December 1986, domestic fuel prices began to move upward once again, reaching a peak of $0.601 per gallon (up 42.4 percent) in November 1987, before falling to $0.472 per gallon (down 21.5 percent) in October 1988.

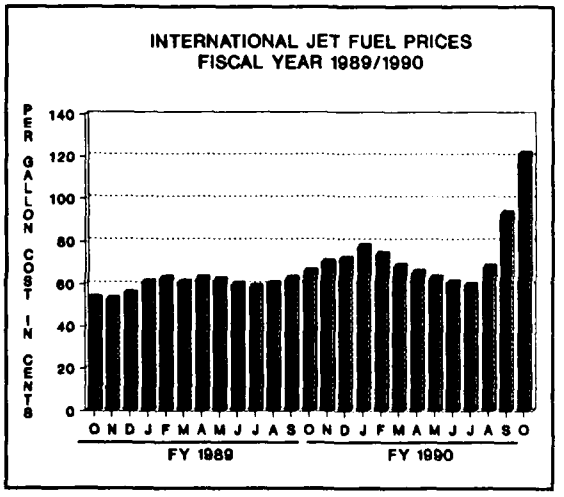
Since November 1988, however, the trend in domestic jet fuel prices has generally been upward. By February 1990, the price had risen to $0.783 per gallon, the highest recorded price since May 1981. U.S. airlines enjoyed a brief respite in prices (declining to $0.564 per gallon in July) before the Iraqi invasion of Kuwait pushed prices up to $0.897 per gallon in September and to $1.113 per gallon in October. Domestic jet fuel prices have since declined to $1.092 per gallon in November and to the low to mid $0.80 per gallon range in December and January.

Domestic jet fuel prices are forecast to average $0.814 per gallon (up 21.9 percent) in fiscal year 1991. Prices are then expected to decline to $0.584 per gallon (down 28.3 percent) in 1992 before increasing to $0.605 per gallon (up 3.6 percent) in 1993. Over the 12-year forecast period, domestic jet fuel prices are projected to increase at an average annual rate of 3.9 percent, reaching $1.052 per gallon in fiscal year 2002. In real dollars (1982-84$), the price of domestic jet fuel is projected to decline from $0.525 cents per gallon in 1990 to $0.477 per gallon in 2002, an annual rate of decline of 0.8 percent.

Discounting the large increase in 1990 and large decline in 1991, prices are expected to increase by 6.1 percent annually over the last 10 years of the forecast period, increasing by 1.4 percent annually in real dollars.

International Jet Fuel Prices

International jet fuel prices averaged $0.705 per gallon in fiscal year 1990, an increase of 17.7 percent over the average price paid in 1989. However, on a month over month basis, jet fuel prices increased from $0.631 per gallon

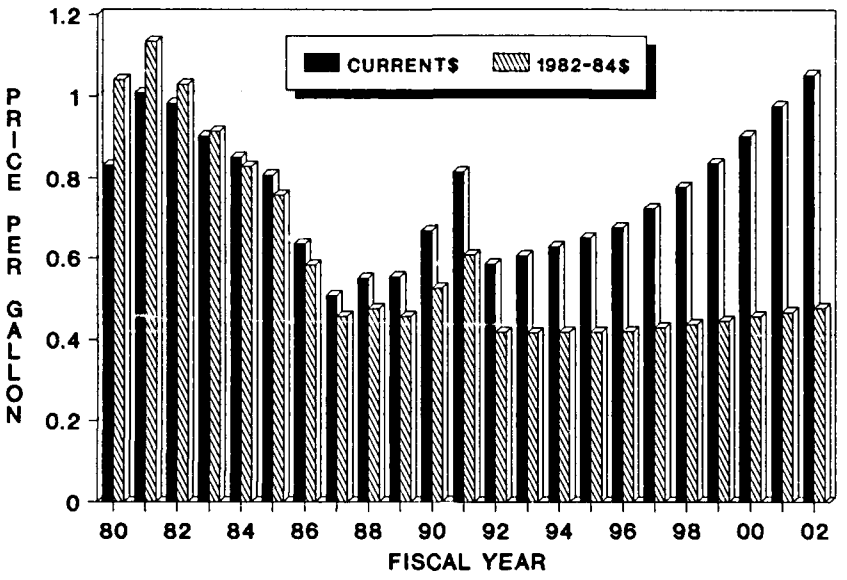


in September 1989 to $0.937 per gallon in September 1990, a 48.4 percent increase.

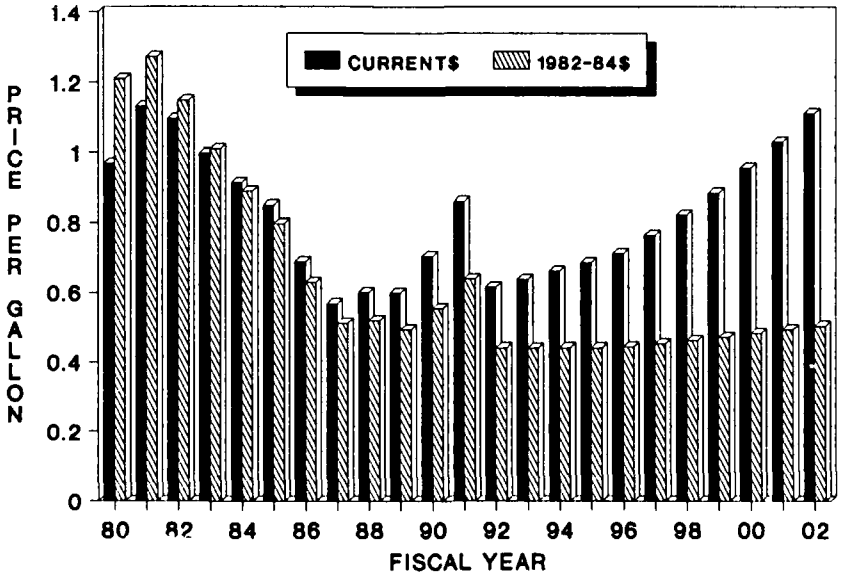
International jet fuel prices peaked at $1.168 per gallon in May 1981. Over the following 66 months (June 1981 to November 1986) the price of international jet fuel declined 57.2 percent

U.S COMMERCIAL AIR CARRIERS
JET FUEL PRICES

DOMESTIC OPERATIONS



INTERNATIONAL OPERATIONS



to $0.499 per gallon. Starting in December 1986, however, international jet fuel prices edged upward again, peaking at $0.652 per gallon in December 1987 before declining to $0.534 per gallon in November 1988. Since then, the trend has been generally upward, peaking at $0.782 per gallon in February and again at $1.284 per gallon in November.

The price of international jet fuel is projected to increase to $0.86 per gallon (up 22.0 percent) in fiscal year 1991. Prices are then forecast to decline to $0.616 per gallon (down 28.4 percent) in 1992 before increasing to $0.639 per gallon (up 43.7 percent) in 1993.

Over the 12-year forecast period, international jet fuel prices are projected to increase at an average annual rate of 3.9 percent (down 0.8 percent annually in real dollars), reaching $1.111 per gallon in fiscal year 2002.

Discounting the volatility of jet fuel prices in 1990 and 1991, international jet fuel prices are forecast to increase at an annual rate of 6.1 percent over the last 10 years of the forecast period. In real dollars, prices are expected to increase by 1.4 percent annually over the same time period.

PASSENGER YIELDS

Between 1984 and 1987, the cost of air travel (as measured by passenger yield, i.e., revenue received per passenger mile) on U.S. airlines declined by 11.1 percent in nominal dollars and by 17.9 percent in real dollars (FY 1990 base). However, over the past three years, the per mile cost of air travel has increased by 15.3 percent, from 10.93 cents in 1987 to 12.60 cents in 1990. In real dollars, passenger yields have remained basically constant, increasing slightly (0.9 percent) from 12.49 cents to 12.60 cents over the same time period.

There are at least three factors which have the potential to be disruptive of the short-term fare policy of U.S. air carriers. These factors are (1) the predicted downturn in the U.S. economy in 1991, (2) the precarious financial position of several air carriers which has been further exacerbated by higher fuel prices, and (3) the large numbers of aircraft scheduled to be delivered to U.S. airlines in 1991 and 1992. Despite the above, this year's forecast assumes that there will be no major fare wars to stimulate traffic demand.

Because of the expected economic downturn, there will be added pressure on the financially weak carriers to introduce deep discounted fares (largely uneconomic) to maintain cash flow. Even the healthiest of carriers may, because of the large numbers of aircraft being delivered in 1991 and 1992, feel compelled to resort to deep discounted fares to fill otherwise empty seats or gain market share at the expense of the financially weak carriers (e.g., Companions-Travel-Free Promotion in November 1990). Although the forecast assumes that there will be heavy fare discounting in both 1991 and 1992, it is believed that the industry has achieved a certain maturity or sophistication with regard to fare policy. Therefore, the industry will be less likely to resort to the destructive price competition so prevalent during previous periods of slow growth. "Yield management" will be expected to play an increasingly important role in allocating the number of discount seats available on an individual flight, matching uneconomic discount fares only in those markets where necessary to meet competition.

The forecast also assumes that there will be sufficient pressure from competition and other market forces, including the possible threat of legislative initiatives, to keep fare increases (with the exception of fuel

surcharges) to a minimum over the next several years. However, the forecast also assumes that the industry merger/ consolidation phase will continue over the next several years and that could lead to greater concentration within the industry. Therefore, over the longer term, the forecast assumes that the surviving carriers will seek to increase profits and preserve yield at the expense of slower traffic growth.

Passenger yields are forecast to increase to 13.59 cents (up 7.9 percent) in fiscal year 1991, the increase largely reflecting the fuel surcharge increases (both domestic and international) which were implemented during the August to October 1990 time period. Passenger yields are also forecast to increase an additional 2.5 percent in 1992 (to 13.93 cents). In real terms (FY 1990$), passenger yields are forecast to increase by 2.2 percent (to 12.87 cents) in 1991 and then decline by 0.9 percent (to 12.75 cents) in 1992.

However, the passenger yield forecasts for 1991 and 1992 do not include two costs that will increase the cost of air travel even further. Effective December 1, 1990, the ticket tax paid on all domestic air travel increased from 8.0 to 10.0 percent and effective July 1, 1991, U.S. airports will be permitted to impose a Passenger Facility Charge (PFC) of up to $1.00, $2.00, or $3.00 for each paying passenger enplaned at the airport to finance eligible airport related projects. (PFC's will be limited to the originating airport plus one connection, i.e. maximum charge of $6 per passenger/each one-way trip.) Neither of these two costs enter into the passenger yield calculation since the ticket tax goes directly into the Aviation Trust Fund and the PFC's would be returned to the individual airports.

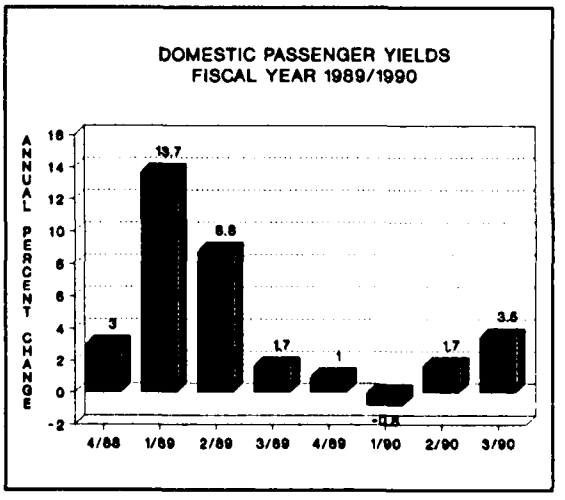
Our analysis of these two costs indicates that the overall cost of air travel (domestic and international) would increase by an additional 1.3 percent in 1991 and by an additional 1.5 percent in 1992. If these two costs are included in the passenger yield calculation (for comparative purposes only), the 1992 passenger yield would increase to 14.31 cents, 2.7 percent higher than the 13.93 cents forecast for that year. The greatest impact would be felt by domestic travellers.

Over the 12-year forecast period, system yields are expected to increase at an average annual rate of 4.0 percent, reaching 20.24 cents in 2002. However, if we discount the first year of the forecast, the increase over the final 11 years of the forecast period is only 3.7 percent annually.

In real terms, passenger yields are expected to decline by 0.6 percent annually, from 12.60 cents in 1990 to 11.68 cents in 2002. If we eliminate 1991 from the calculation, real yields are projected to decline by 0.9 percent annually between 1991 and 2002.

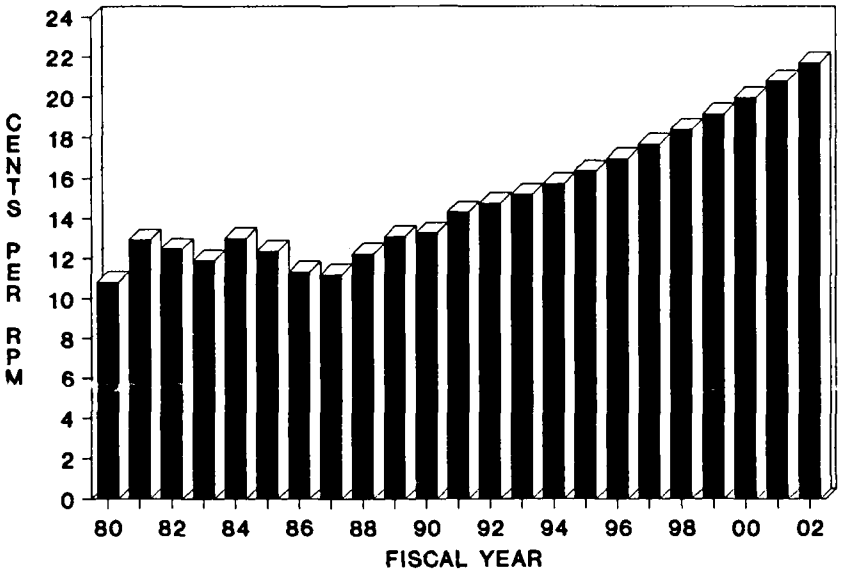
Domestic Passenger Yields

Domestic passenger yields, after declining on a year-over-year basis for 10 consecutive quarters (fourth quarter 1984 to first quarter 1987), have now increased for 13 of the last 14 quar-

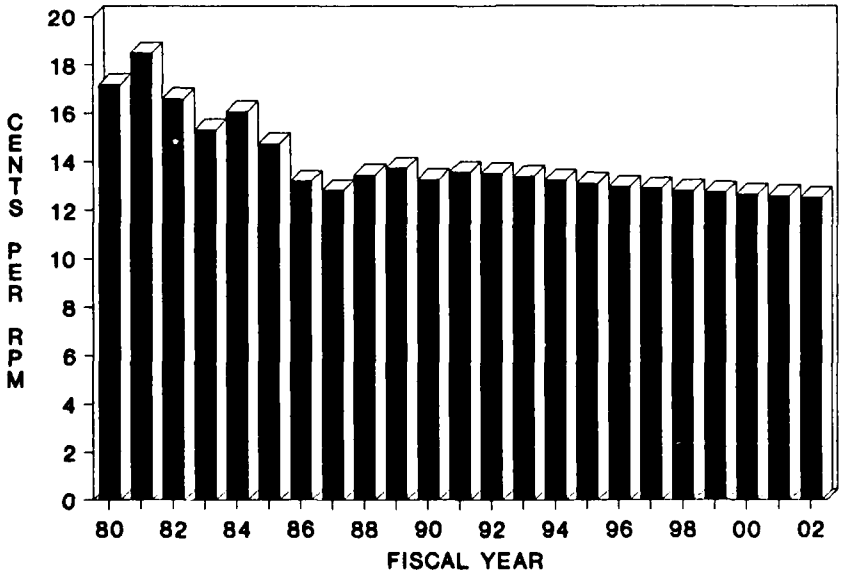


U.S COMMERCIAL AIR CARRIERS
DOMESTIC PASSENGER YIELD

CURRENT DOLLARS



REAL (FY 1990) DOLLARS



ters (down 0.8 percent in first quarter 1990). As a result, domestic passenger yields have increased from 11.20 cents in 1987 to 12.23 cents (up 9.2 percent) in 1988, to 13.07 cents (up 6.9 percent) in 1989, and to 13.25 cents (up 1.4 percent) in 1990. In real dollars (FY 1990$), domestic passenger yields have increased from 12.80 cents in 1987 to 13.25 cents in 1990, an increase of only 3.5 percent. However, real yields actually declined by 3.3 percent in fiscal year 1990.

Since the August 2, 1990 Iraqi invasion of Kuwait and the resultant upward spiral in jet fuel costs, U.S. air carriers have implemented three separate fuel surcharges totaling over 15 percent (5.3 percent in September and 4.2 and 5.8 percent in October). Assuming that additional fuel surcharges will be unnecessary (and assuming some fare dilution from fare discounting and falling fuel prices in the latter half of the year), domestic passenger yields are forecast to increase by 8.0 percent (to 14.31 cents) in 1991 and by 3.0 percent (to 14.74 cents) in 1992. In real terms, domestic yields are projected to increase by 2.3 percent (to 13.55 cents) in 1991 and then decline by 0.4 percent (to 13.50 cents) in 1992.

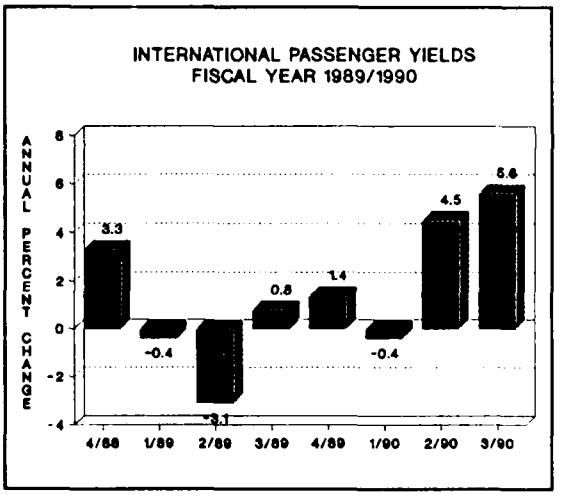
Domestic fare levels are, however, directly impacted by both the increase in the airline ticket tax and by the imposition of PFCs at U.S. airports. Our analysis indicates that U.S. domestic air fares will increase by an additional 1.6 percent in 1991 and by an additional 2.0 percent in 1992 as a direct result of the recent tax legislation. To put these cost increases in perspective, domestic passenger yields in fiscal year 1992 would increase to 15.27 cents with the addition of these two costs, 3.6 percent higher than actually forecast for that year.

Domestic yields are projected to increase by 4.2 percent annually over the 12-year forecast period, reaching 21.69 cents in fiscal year 2002. Real domestic yields are forecast to decline from 13.25 cents in 1990 to 12.51 cents in 2002, an average annual rate of decline of 0.5 percent.

If we disregard the large increases required in 1991 to cover rising fuel costs, domestic passenger yields are expected to increase only 3.9 percent annually over the last 11 years of the forecast period, declining by 0.7 percent annually in real dollars.

International Passenger Yields

International passenger yields have increased, albeit gradually, in all but two years (1984 and 1985) since 1978.



Over the last five years, international yields have increased by 14.4 percent (up 3.1 percent 1990), from 9.34 cents in 1985 to 10.68 cents in fiscal year 1990. In real terms (FY 1990$), international yields have declined 4.0 percent over the same time period, from 11.12 cents in 1985 to 10.68 cents in 1990 (down 1.7 percent in 1990).

International yields are subjected to the same pressures as are domestic yields in that fare levels must also attempt to cover the rapidly rising fuel costs. The difference is that most international fare increases/decreases must meet International Air

Transport Association (IATA) guidelines and/or approval by foreign governments.

During 1990, there have been a number of IATA approved fare increases whose full impact will be felt in 1991. In addition, U.S. international air carriers also implemented a fuel surcharge on international fares (approximately 7.0 percent), effective in October 1990. Based on these approved fare increases (and assuming some fare dilution from fare discounting and falling fuel prices during the latter half of the year), international yields are forecast to increase to 11.60 cents (up 8.6 percent) in 1991 and to 11.79 cents (up 1.6 percent) in 1992. Over the 12-year forecast period, international yields are expected to increase at an annual rate of 3.9 percent, reaching 16.95 cents by 2002.

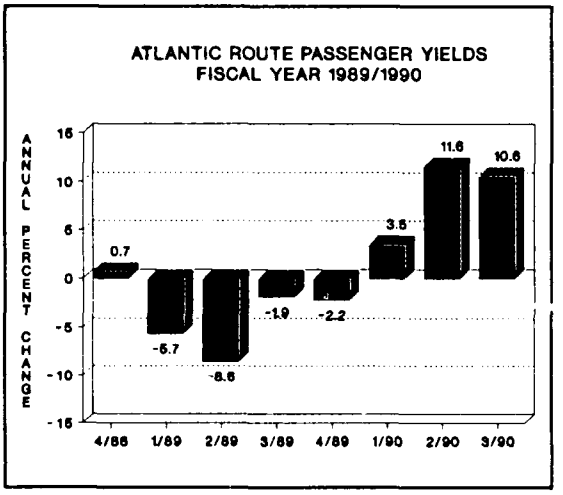
Real international passenger yields are forecast to increase 2.9 percent (to 10.99 cents) in 1991, then decline 1.8 percent (to 10.79 cents) in 1992. Over the 12-year forecast period, real international yields are expected to decline 0.7 percent annually, reaching 9.78 cents in fiscal year 2002.

If we consider only the final 11 years of the forecast period, international passenger yields are forecast to increase 3.5 percent annually in nominal dollars and to decline by 1.1 percent annually in real dollars.

Atlantic Routes

Passenger yields on transatlantic routes averaged 9.56 cents in fiscal year 1990, 6.6 percent above the 1989 fare level (up over 10.0 percent in the last half of the year). In real terms (FY 1900$), atlantic yields increased 1.6 percent in 1990. Although passenger yields on the Atlantic routes have increased in four of the last five years (down 3.7 percent in 1989), they have increased only 5.6 percent since 1981. In real terms, Atlantic route passenger yields have declined by 26.1 percent over the last nine years, from 12.94 cents in 1981 to 9.56 cents in 1990.

During 1990, there have been three approved IATA fare increases on transatlantic routes (5.0 percent in February, 4.0 percent in May, and 3.0 percent in August), with additional increases pending in December. In addition, U.S. air carriers also implemented a fuel surcharge (7.0 percent) in October. Based on these approved fare increases (and assuming some fare dilution), passenger yields on the Atlantic routes are forecast to increase to 10.53 cents (up 10.1 percent) in fiscal year 1991 and to remain at this level through 1992. In real terms, yields are forecast to increase to 9.97 cents (up 4.3 percent) in 1991, then decline to 9.64 cents (down 3.3 percent) in 1992.

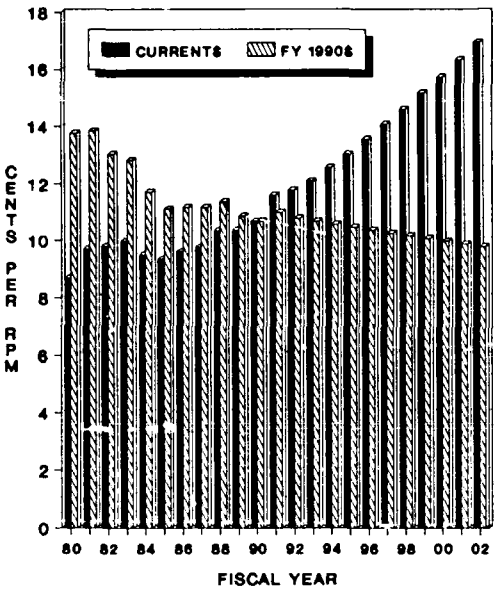


Transatlantic route yields are forecast to reach 15.10 cents by the year 2002, an average annual increase of 3.9 percent. However, real Atlantic route yields are expected to decline to 8.71 cents in 2002, an average annual rate of decline of 0.8 percent.

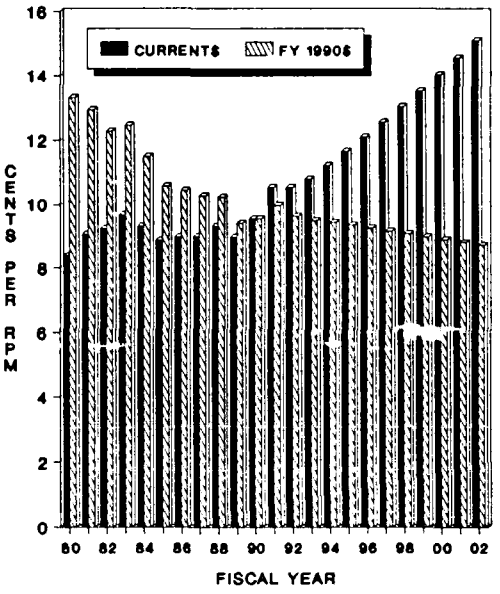
Discounting the large fare increases necessary to cover increased jet fuel prices in 1991, transatlantic passenger yields are projected to increase by only 3.3 percent annually over the last

U.S. COMMERCIAL AIR CARRIERS
INTERNATIONAL PASSENGER YIELDS

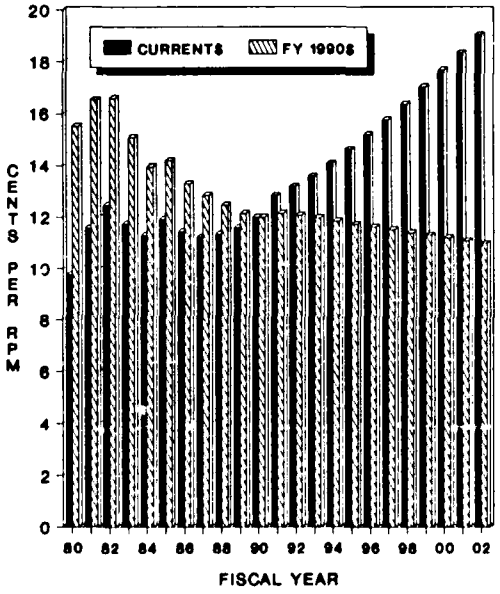
ALL INTERNATIONAL ROUTES



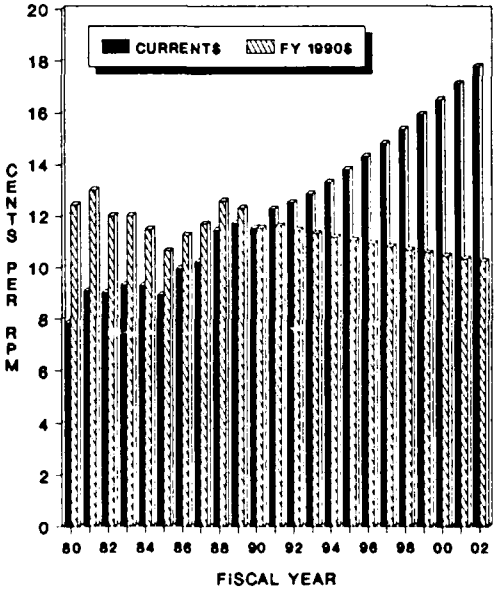
ATLANTIC ROUTES



LATIN AMERICA ROUTES



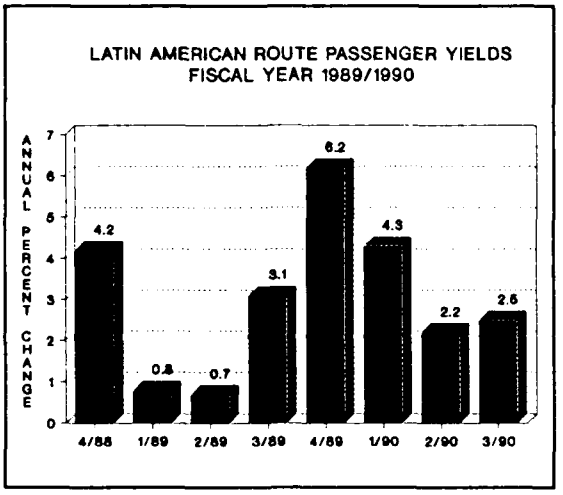
PACIFIC ROUTES



11 years of the forecast period. In real terms, yields on the Atlantic routes are expected to decline by 1.2 percent annually between 1991 and 2002.

Latin American Routes

Passenger yields on the Latin American routes increased to 11.99 cents (up 3.5 percent) in fiscal year 1990. In real terms (FY 1990$), Latin American passenger yields declined 1.4 percent in 1990. Although passenger yields on



the Latin American routes have increased in each of the last three years (up a cumulative 6.8 percent), they have increased only 3.6 percent since 1981. In real terms, Latin American passenger yields have declined by 27.5 percent over this same nine-year time period, from 16.53 cents in 1981 to 11.99 cents in 1990.

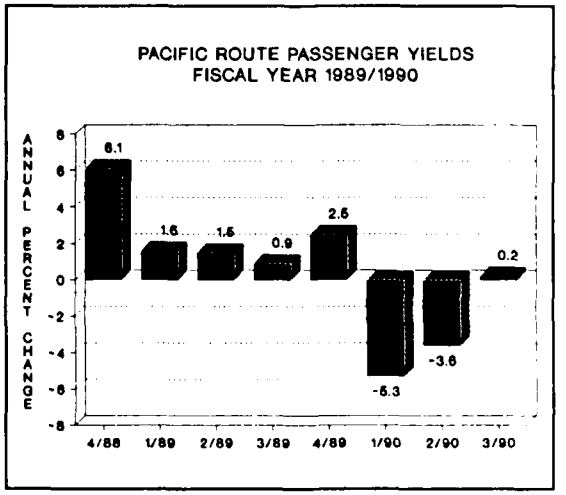
Because of expected new service and increased competition on the Latin American routes in 1991, passenger yield increases on these routes is forecast to be somewhat lower than economics alone might dictate. In addition, yields on the Latin American routes are already considerably higher than those on other international routes, due, in large part, to the large percentage of first class passengers who travel these routes.

Passenger yields on the Latin American routes are forecast to increase to 12.83 cents (up 7.0 percent) in 1991 and to 13.18 cents (up 2.7 percent) in 1992. In real terms, yields are forecast to increase by 1.3 percent (to 12.15 cents) in 1991 and decline by 0.7 percent (to 12.07 cents) in 1992.

Over the 12-year forecast period, passenger yields are forecast to increase at an annual rate of 3.9 percent, averaging 19.03 cents in the year 2002. Yields are projected to decline by 0.7 percent annually in real dollars, reaching 10.98 cents in fiscal year 2002.

Pacific Routes

In fiscal year 1990, transpacific passenger yields (11.55 cents) declined by 1.6 percent, 6.2 percent in real terms (FY 1990$). The decline in 1991 follows four consecutive years (1986 to 1989) of increases, a period during



which passenger yields increased 31.3 percent in nominal terms and 15.6 percent in real terms.

Because of the recently authorized major expansion of air service to Japan (six new scheduled combination--passenger and cargo--services to the Far East from five U.S. cities), large capacity increases have been forecast for the

transpacific routes. Since foreign flag carriers can be assumed to be contemplating similar or even larger increases in capacity, the competition for traffic in this region is expected to be fierce. Lower fares is one way to compete and fill seats. Therefore, fare increases in the transpacific market in 1991 and 1992 are forecast to be less than would be expected, given the recent volatility of jet fuel prices.

Pacific route passenger yields are forecast to increase to 12.28 cents (up 6.3 percent) in 1991 and to 12.53 cents (up 2.0 percent) in 1992. In real terms, yields are expected to increase by 0.7 percent (to 11.63 cents) in 1991 and to decline by 1.3 percent (to 11.47 cents) in 1992.

Transpacific passenger yields are projected to increase by 3.7 percent annually over the 12-year forecast period, reaching 17.78 cents in fiscal year 2002. In real dollars, passenger yields are forecast to decline to 10.26 cents in 2002, a decline of 1.0 percent annually.

PASSENGER TRIP LENGTH

The average system passenger trip length (976.1 miles), increased by almost 28 miles in fiscal year 1990, largely the result of increased international traffic. The average trip length is forecast to increase by over seven miles annually over the 12-year forecast period, reaching 1,061 miles by fiscal year 2002.

It should be noted, however, that there are likely to be large swings around the trend line. The movement in any one year will depend on the discount fare policies adopted by U.S. air carriers and by the mix of business/vacation and domestic/international travelers.

Domestic Passenger Trip Length

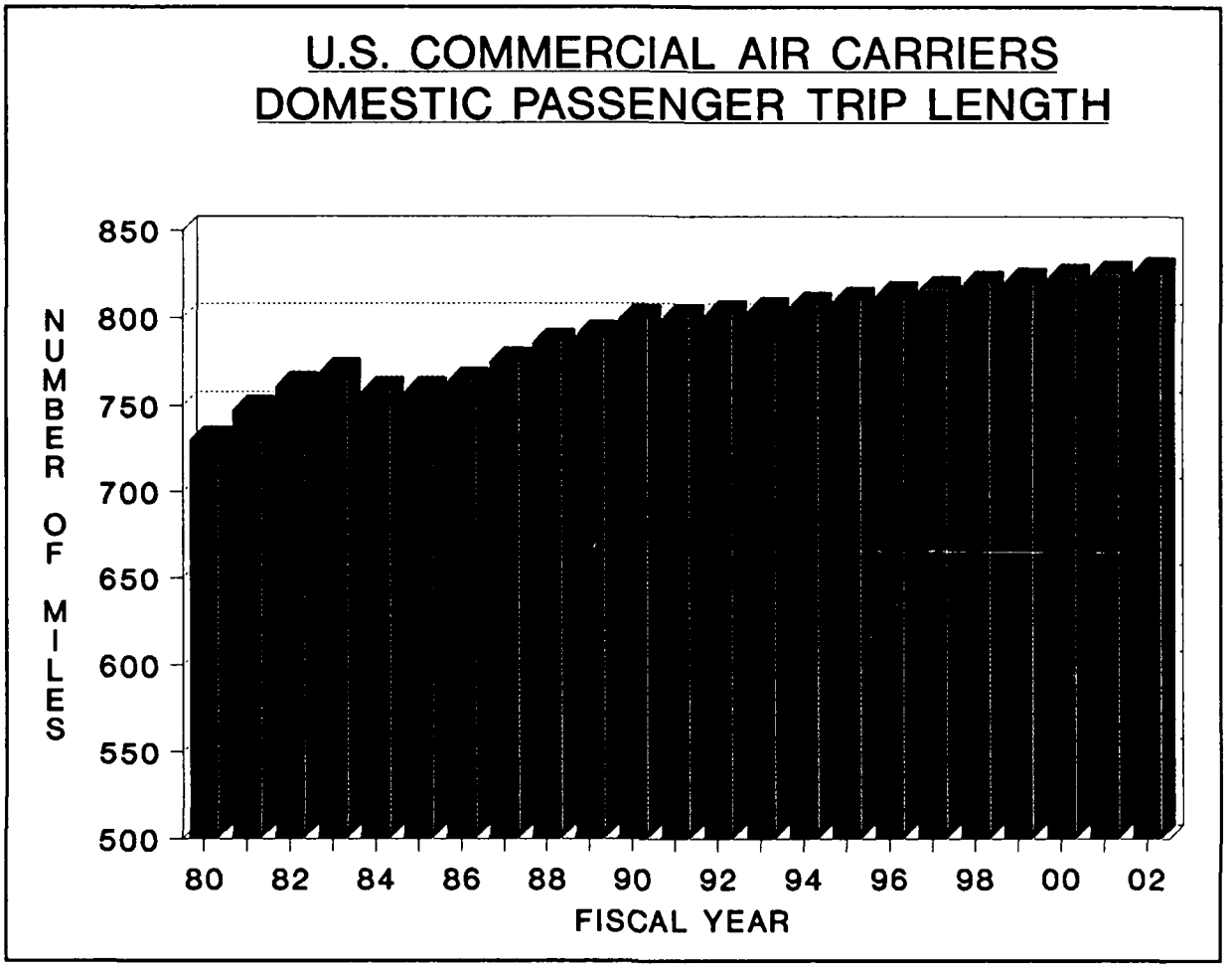
Over the past four years, the average domestic passenger trip length has increased by almost 36 miles, growing from 764.1 miles in fiscal year 1986 to 799.7 miles in fiscal year 1990. The domestic passenger trip length increased 9.4 miles in 1990.

The projected economic recession in 1991 and uncertain economic outlook over the next several years, combined with relatively large increases in fares, is expected to have a greater impact on the generally longer distance discretionary or vacation trips than on the shorter distance business trips. As such, the average domestic trip length is forecast to remain relatively constant at 800 miles in 1991 before resuming its upward trend in 1992.

The forecast, however, assumes a continuation in the expansion of the newer medium sized hubs whose trip lengths, on average, tend to be of shorter distance than trips from the more established large hub airports. Therefore, the domestic passenger trip length is forecast to increase at a somewhat slower pace than that achieved during the past decade (up seven miles annually). The domestic trip length is expected to increase by an average of just over two miles per year over the 12-year forecast period, reaching 827 miles by fiscal year 2002.

International Passenger Trip Length

The average international passenger trip length (2,792.2 miles) increased by almost 58 miles in fiscal year 1990, this on top of a 90-mile increase in 1989. The increases over the past two years result largely from two factors. First, the large traffic growth in the longer haul transpacific markets tends to exert a disproportionate effect on



the average international trip length. Second, the increase in the number of transatlantic gateways and overflying of established gateways in both the U.S. and Europe have substantially increased the average transatlantic passenger trip length.

The international trip length is projected to increase to 2,796 miles (up 4 miles) in 1991 and to 2,829 miles (up 33 miles) in 1992. Over the 12-year forecast period, the international passenger trip length is forecast to increase by almost 15 miles per year, reaching 2,968 miles in fiscal year 2002. Much of the projected increase, especially after 1991, results from the fact that travel demand between the United States and the longer distance Pacific destinations is expected to increase at a considerably faster rate than travel to other international destinations.

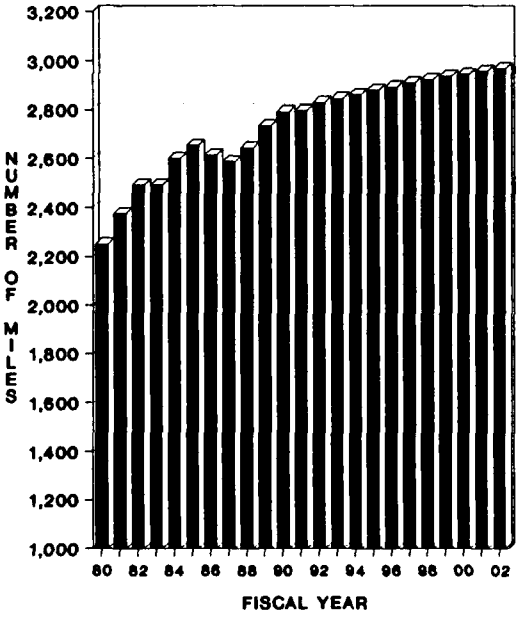
Atlantic Routes

The average passenger trip length on the Atlantic routes (3,341.4 miles) has increased by more than 236 miles over the past three years and by over 69 miles in fiscal year 1990. The large increases are due, in large part, to the increased utilization of widebody twins (B-767 and A-310) on the transatlantic routes and the overflying of the established gateway airports on both sides of the Atlantic. These smaller capacity aircraft have allowed U.S. carriers to provide first-time service between interior U.S. airports and interior European airports, thereby avoiding the more heavily congested New York and London area airports.

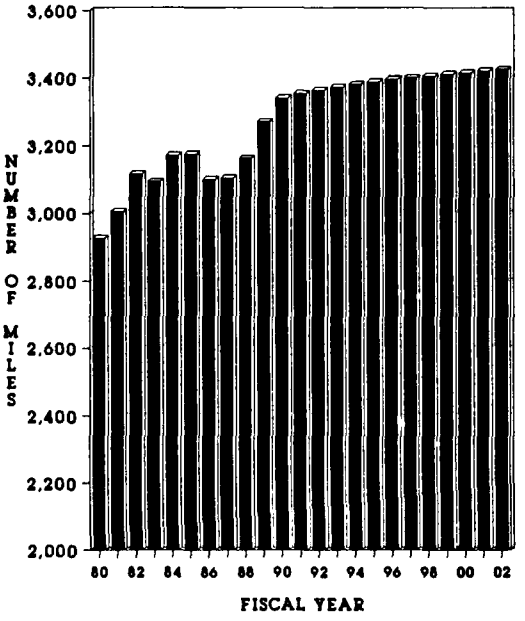
The Atlantic passenger trip length is forecast to increase to 3,355 miles (up 14 miles) in 1991. The transatlantic

U.S. COMMERCIAL AIR CARRIERS
INTERNATIONAL PASSENGER TRIP LENGTH

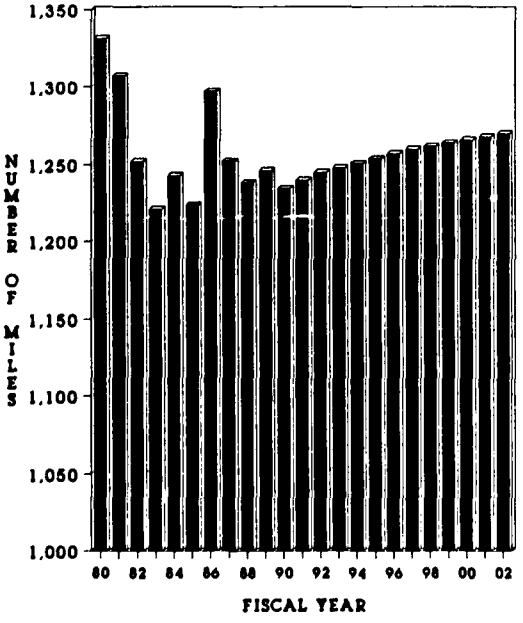
ALL INTERNATIONAL ROUTES



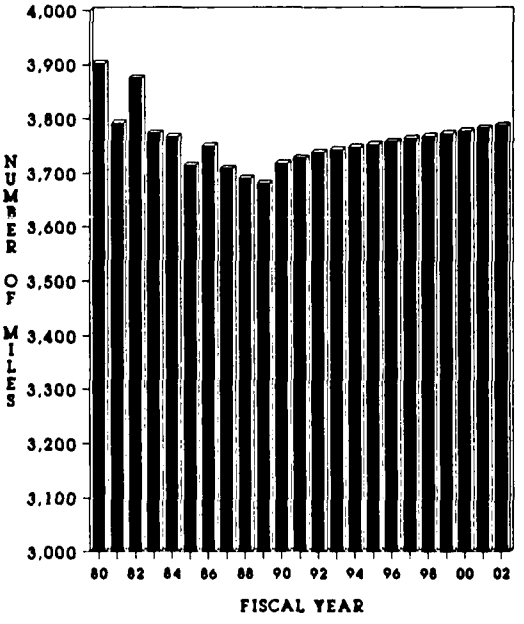
ATLANTIC ROUTES



LATIN AMERICAN ROUTES



PACIFIC ROUTES



average passenger trip length is forecast to increase by over seven miles annually over the 12-year forecast period, reaching 3,427 miles in fiscal year 2002.

Latin American Routes

The Latin American average passenger trip length (1,234.8 miles) has declined by almost 63 miles since 1986, declining almost 14 miles in fiscal year 1990. The Eastern Air Lines' strike (beginning March 1989) and the subsequent sale of its South American routes to American Airlines has, in effect, distorted much of the 1989 and 1990 data, thereby altering historical trends which were evident from analyses of previous years data.

The decreases in the passenger trip length in 1987 (45.1 miles) and 1988 (13.5 miles) are believed to be largely the result of increased service to many of the shorter distance Caribbean and Mexican destinations. An analysis of the pre- and post-strike data shows many of the same trends continue to be evident in both 1989 and 1990.

The Latin American average passenger trip length is projected to increase by more than 10 miles during the next two years, reaching 1,245 miles in 1992. The increased passenger trip length is largely due to two factors. The first factor is that American Airlines purchased the Eastern Air Lines South American routes in 1990 and can be expected to be more aggressive in promoting the longer haul markets. The second factor is that Pan American has recently announced its intention to shift emphasis and equipment from its North Atlantic routes to its Middle/South American routes.

Over the 12-year forecast period, the Latin American passenger trip length is projected to increase by just under three miles annually, reaching 1,270 miles in fiscal year 2002.

Pacific Routes

The average passenger trip length on the Pacific routes (3,718 miles) increased by more than 37 miles in fiscal year 1991, reversing a trend that had seen the average trip length decline by almost 70 miles during the previous three-year (1987 to 1989) period.

The average passenger trip length for the transpacific routes is expected to increase by 20 miles over the next two years, reaching 3,738 miles in 1992. Over the 12-year forecast period, the Pacific passenger trip length is forecast to increase by almost six miles annually, reaching 3,788 miles in fiscal year 2002.

AVERAGE AIRCRAFT SIZE

Between 1978 and 1983, the average system seating capacity of aircraft utilized by U.S. commercial air carriers increased by almost 20 seats (from 147.2 to 167.1 seats). Since 1983, however, the average seating capacity of the U.S. fleet (169 seats in 1990) has increased by just under two seats.

A number of factors are responsible for this lack of growth in the average seating capacity of the U.S. airline fleet. These factors are: (1) deregulation, (2) declining fuel prices (until August 1990), (3) the continued expansion of hub-and-spoke route systems, and (4) the increased utilization of widebody twins on transatlantic routes.

Airport hubbing, with its greater emphasis on higher frequencies, is a direct by-product of deregulation. This has led to a large increase in the number of small narrowbody aircraft in the U.S. fleet. Until the Iraqi invasion of Kuwait, declining jet fuel prices (down 44.0 percent between 1981 and 1989) had allowed U.S. airlines to

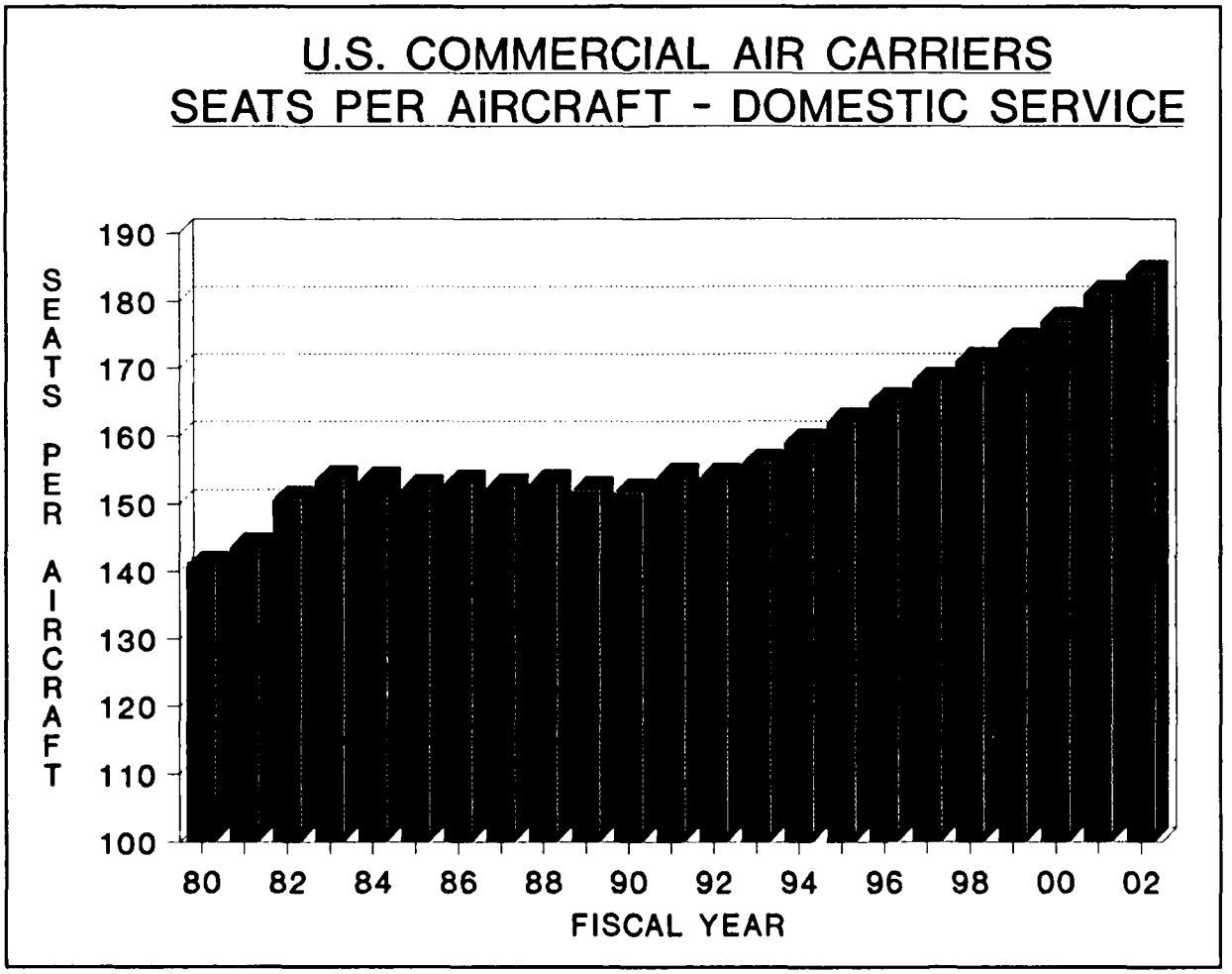
retain large numbers of the older, less fuel efficient, stage-2 aircraft (B-727, DC-9, BAC-111, F-28) in their fleets.

Rapidly rising fuel prices and the projected downturn in the U.S. economy and passenger demand in 1991, is expected to force most U.S. air carriers to either sell/ground or retire many of the smaller capacity stage-2 aircraft. In addition, there is legislation which will require all stage-2 aircraft to be out of the U.S. fleet by January 1, 2000 (with exemptions allowing for some continued use until December 31, 2003). This, added to the fact that the aircraft forecast to be delivered to the U.S. fleet are generally larger than the ones being replaced (the exception being the Fokker 100), should result in an increase in the average seating capacity of the air carrier fleet throughout the forecast period.

The forecast assumes that the average seating capacity of the U.S. commercial airline fleet will increase by almost three seats in 1991 (to 172 seats) and by three seats per year over the entire 12-year forecast period. In fiscal year 2002, U.S. air carrier aircraft are expected to have an average seating capacity of 205 seats.

Domestic Routes
Average Aircraft Size

Between 1978 and 1983, the average seating capacity of aircraft utilized in domestic passenger service increased by just over 17 seats, from 136.4 to 153.6 seats. Since 1983, however, the average seating capacity of domestic aircraft has actually declined by almost two seats (down 0.3 seats in 1990), averaging 151.7 seats in fiscal



year 1990. The continued expansion of the hub-and-spoke route systems and the retention of the older stage-2 aircraft are two of the main reasons for the decline in the average seating capacity of the domestic fleet since 1983.

The forecast assumes an increase in the average seating capacity of domestic aircraft in 1991 (up over two seats to 154 seats), reflecting the retirement and/or grounding of some fuel inefficient stage-2 aircraft in 1991. The average seat size is expected to remain at this same level in 1992 as some of the grounded aircraft is returned to service as jet fuel prices decline. This, in effect, negates any increase in seat size which would have resulted from the delivery of large numbers of larger stage-3 aircraft in 1992.

Thereafter, the pressure to retire stage-2 aircraft is expected to come from the imposition of the national noise policy. Over the 12-year forecast period, we expect the average seating capacity of aircraft utilized in domestic service to increase to 184 seats by fiscal year 2002, an increase of more than two and one-half seats annually.

International Routes
Average Aircraft Size

The average seating capacity of aircraft flown in international passenger service (273.8 seats) has declined by 18 seats since 1986, largely as a result of the increased utilization of the smaller B-767 and A-310 aircraft on the both the transatlantic and Latin American routes. This forecast assumes that this aircraft downsizing trend will continue on both the transatlantic routes and Latin American routes. However, the overall impact is expected to be blunted somewhat by the increased utilization of larger seating capacity aircraft (B-747-400 and MD-11) on the transpacific routes.

The average seating capacity of international passenger aircraft is expected to decline by just over one seat (to 273 seats) in 1991 and to remain at this general level (273 to 274 seats) through 1995. Thereafter, international seating capacity is forecast to increase by between one and three seats annually over the remainder of the forecast period. In fiscal year 2002, aircraft utilized in international passenger service are forecast to have an average seating capacity of 290 seats, 16 more seats than the average seating capacity in 1990.

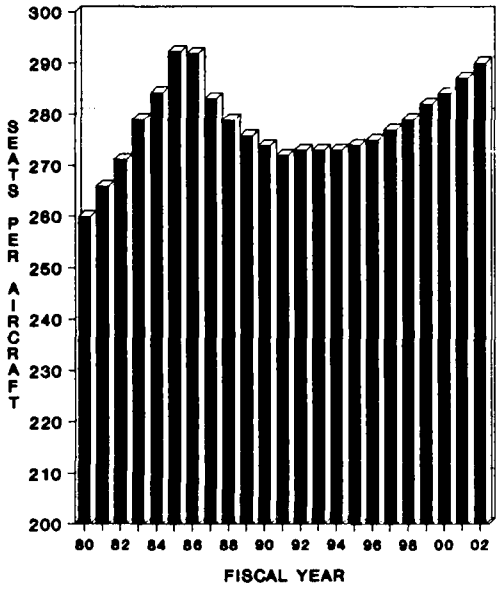
Atlantic Routes

The increased use of widebody twins has reduced the average seating capacity of passenger aircraft on transatlantic routes (278.6 seats) by more than 52 seats during the past four years and by almost 12 seats in fiscal year 1990. This forecast assumes this trend will continue well into the future, albeit at a considerably slower pace than has been the experience over the past four years. The emergence of United and American Airlines (agreements to purchase Pan American's and Tran World's U.S. to London-Heathrow route authority) as major players on the Atlantic, combined with the expected shrinking market share of the two dominant carriers (Trans World and Pan American), suggests that the trend will continue, if not indefinitely, at least for a longer period of time than previous forecasts had foreseen.

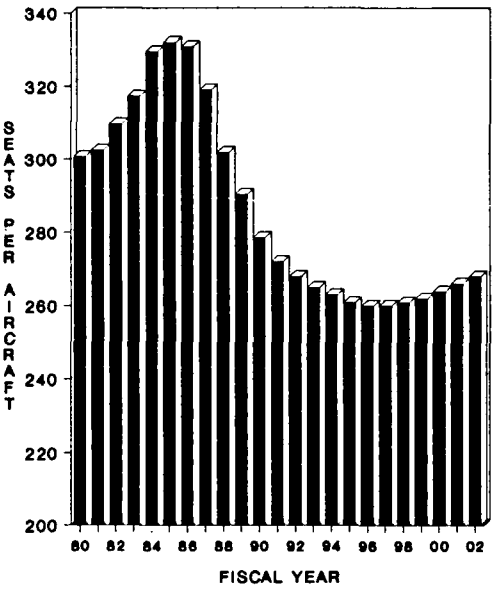
Growth in the transatlantic markets is expected to come from those carriers that either now have, or currently have on order, a large number of the widebody twins. Therefore, the average seating capacity of passenger aircraft used on the transatlantic routes is forecast to decline by almost 19 seats over the next six years, averaging 260 seats in both fiscal years 1996 and 1997. Starting in 1998, however, the average seating capacity of trans-

U.S. COMMERCIAL AIR CARRIERS
SEATS PER AIRCRAFT - INTERNATIONAL SERVICES

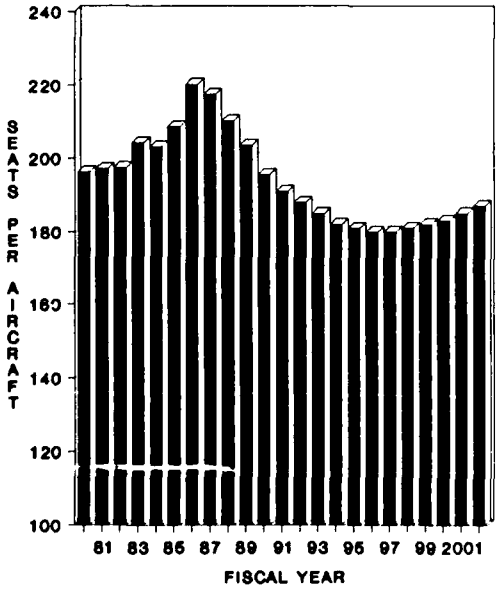
ALL INTERNATIONAL ROUTES



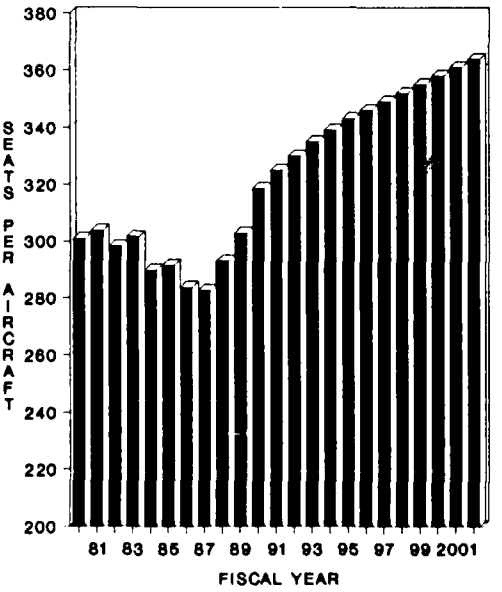
ATLANTIC ROUTES



LATIN AMERICAN ROUTES



PACIFIC ROUTES



atlantic route aircraft is expected to increase by between one or two seats annually over the remainder of the forecast period. In fiscal year 2002, passenger aircraft utilized on the transatlantic are forecast to average 268 seats, nearly 11 fewer seats than the average seating capacity in 1990.

Latin American Routes

The average seating capacity of aircraft utilized on Latin American routes (195.6 seats) has declined by almost 25 seats since 1986 and by eight seats in fiscal year 1990 alone. The American Airlines' purchase of the Eastern Air Lines Central and South American routes assures a continuance of this downward trend. Given American's preference for widebody twins, this forecast assumes that the downward trend in aircraft size will continue over the next six years, with the average aircraft size declining to 180 seats by 1996. Beginning in 1998, the number of seats is expected to increase by one to two seats annually over the remainder of the forecast period. In fiscal year 2002, the average seating capacity of an aircraft utilized in Latin American service is expected to average only 187 seats, almost nine seats less than the average seating capacity in 1990.

Pacific Routes

The average seating capacity of aircraft utilized on transpacific routes (318.6 seats) has increased by 36 seats during the past three years and by almost 16 seats in fiscal year 1990 alone. Because of the extensive re-equipment programs (B-747-400 and MD-11 aircraft) of U.S. carriers now operating on the transpacific routes, this forecast assumes that the average seating capacity of aircraft operating across the Pacific will increase by an average of four to six seats a year over the next five years (reaching 343 seats in 1995). Thereafter, we expect an increase of three seats per year over the remainder of the forecast period. The average seating capacity of an aircraft operating between the United States and Pacific destinations is projected to increase by more than 45 seats over the 12-year forecast period, reaching 364 seats in fiscal year 2002.

It is possible that the smaller two-engine extended range aircraft (currently the B-767-ER and A-310), now utilized extensively between the U.S. and Europe, may be approved for operation on transpacific routes. Based on discussions with representatives at both the Boeing Commercial Airplane Company and the Douglas Aircraft Company, it is believed that these smaller capacity aircraft could serve most transpacific markets from Honolulu by staying within the prescribed two hours of land at all times. However, this forecast has not assumed the introduction of these particular aircraft on the transpacific routes during the current 12-year forecast period.

PASSENGER LOAD FACTOR

In fiscal year 1990, U.S. scheduled air carriers recorded a systemwide load factor of 62.8 percent, 0.2 points below the 1989 load factor and only 0.4 points below the record high load factor of 63.2 percent achieved in 1979. The 1989 load factor (63.0 percent) was, however, inflated somewhat by the Eastern Air Lines strike.

Based on aircraft delivery schedules, forecasts of stage-2 aircraft retirements/grounding, and projected capacity and traffic levels, the system load factor is expected to decline to 60.3 percent (down 2.5 points) in 1991 and to stay at this approximate level (60.4 to 60.6 percent) through 1994.

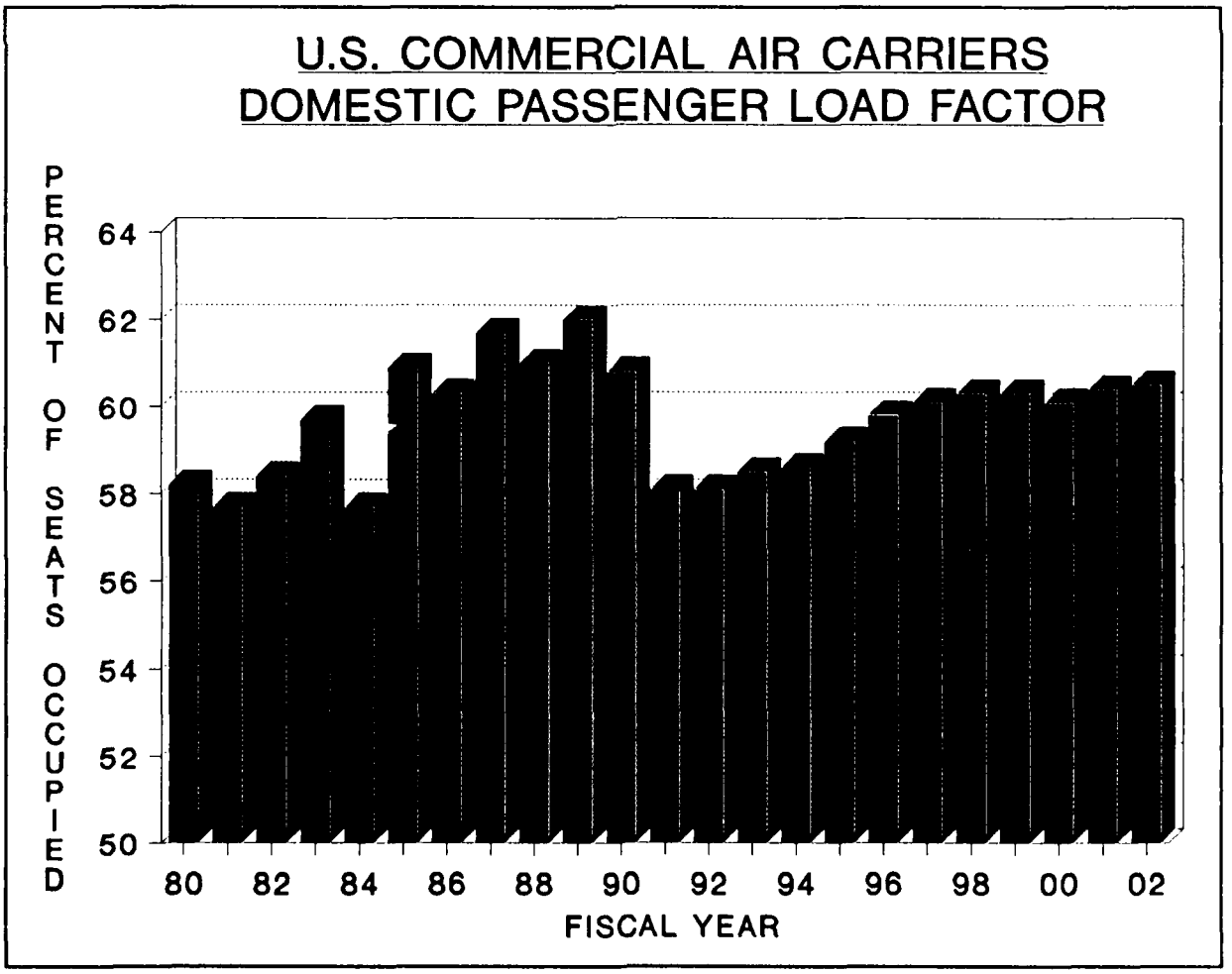
Thereafter, system load factors are projected to increase gradually over the remainder of the forecast period, reaching an average of 62.6 percent in fiscal year 2002.

Domestic Passenger Load Factor

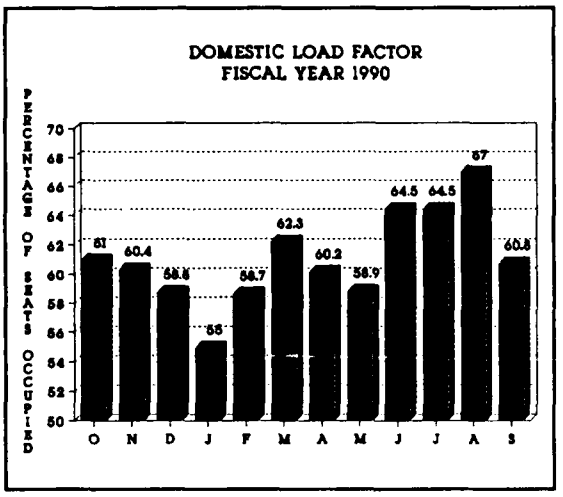
U.S. scheduled domestic air carriers achieved a load factor of 60.8 percent in fiscal year 1990, 1.2 points lower than the 1989 load factor. However, the Eastern Air Lines' strike is estimated to have added as much as 2.0 points to the 1989 domestic load factor (62.0 percent).

The projected downturns in the U.S. economy and domestic traffic, combined with the large number of aircraft deliveries is expected to result in a significant decline in the domestic load factor in 1991. However, the decline is expected to be blunted somewhat by the retirement/grounding of larger numbers of fuel inefficient stage-2 aircraft than has been the case in previous years. In addition, U.S. airlines can be expected to cutback or eliminate some of their lower load factor, uneconomic service and/or to reduce the utilization of some of its fuel inefficient older aircraft.

The net result of these capacity adjustments is expected to be a 2.7 point decline in the domestic load factor (to 58.1 percent) in fiscal year 1991. This is considerably higher than would be the case if actions are not taken to reduce capacity levels. The load factor is expected to remain at this lower level (58.1 to 58.6 percent) through 1994 before beginning a gradual upward climb in 1995. The domestic

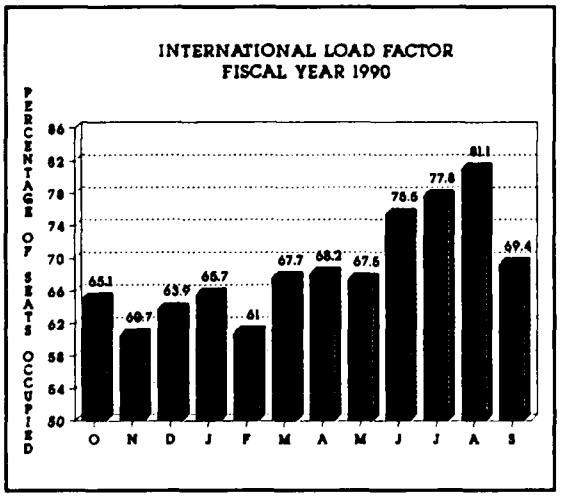


load factor is forecast to increase gradually over the remaining seven years of the forecast period, reaching 60.5 percent in fiscal year 2002.



International Passenger Load Factor

U.S. scheduled international airlines reached a record high load factor (69.2 percent) in fiscal year 1990, 2.6 points higher than the 1989 load factor (66.6 percent) and 2.5 points higher than the previous high load factor (66.9 percent) recorded in 1988. The Eastern Air Lines' strike is thought to have had only minimal impact (adding approximately 0.5 points) on the overall 1989 international load factor.



The large increases projected in international capacity over the next several years is expected to result in declining international load factors through the first four years of the forecast period. International load factors are forecast to decline to 67.1 percent (down 2.1 points) in 1991 and to 66.1 percent by 1994. Thereafter, load factors are expected to increase gradually over the remainder of the forecast period. In fiscal year 2002, the international load factor is forecast to average 67.7 percent, 1.5 points lower than the load factor achieved in 1990.

Atlantic Routes

Load factors on the transatlantic routes averaged 69.8 percent in fiscal year 1990, 4.1 points higher than the 1989 load factor and 0.8 points higher than the previous record high load factor (69.0 percent) recorded in 1984. The record 1990 load factor was largely the result of a slowing of Atlantic route capacity gains (up 2.9 percent), despite a continuance of relatively large traffic gains (up 9.4 percent).

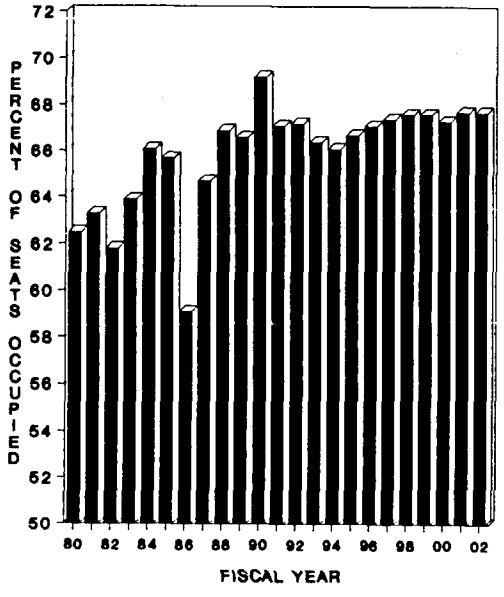
Atlantic route load factors are forecast to decline over the next four years, declining to 66.4 percent (down 3.4 points) in 1991 and to 65.8 percent by 1994. Thereafter, the transatlantic load factor is forecast to increase gradually over the remainder of the forecast period, reaching 67.5 percent in fiscal year 2002. The passenger load factor forecast achieved in 2002 is 2.3 points lower than the 1990 load factor.

Latin American Routes

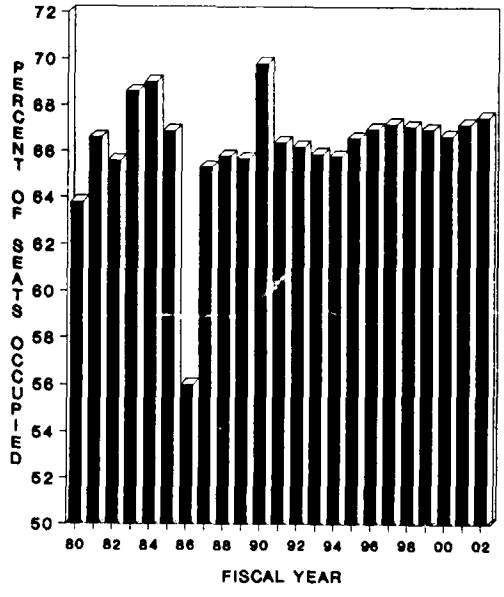
U.S. scheduled airlines achieved a 62.0 percent load factor on the Latin American routes in fiscal year 1990, an increase of 0.2 points above the 1989

U.S. COMMERCIAL AIR CARRIERS
INTERNATIONAL PASSENGER LOAD FACTOR

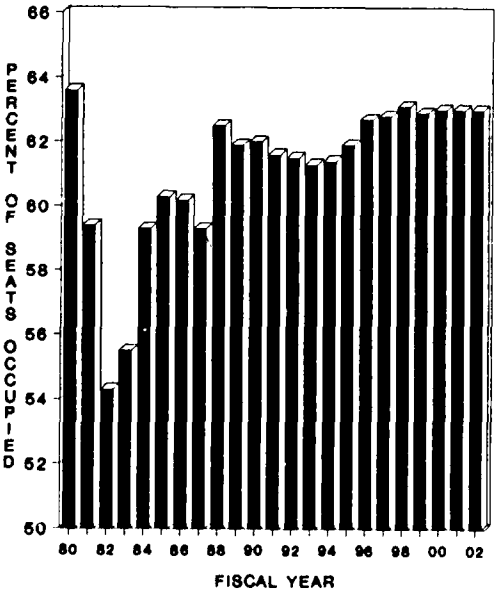
ALL INTERNATIONAL ROUTES



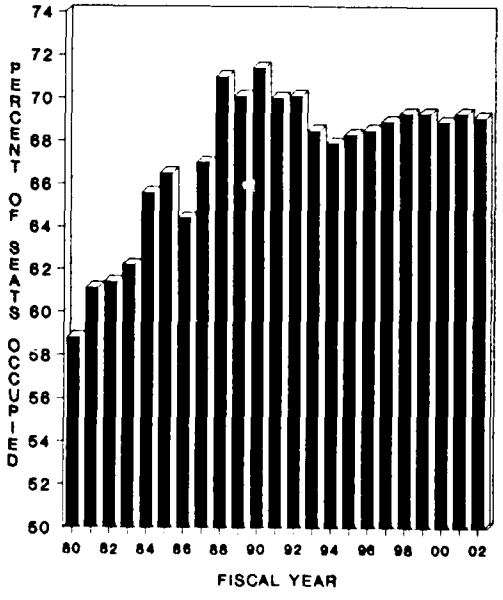
ATLANTIC ROUTES



LATIN AMERICA ROUTES



PACIFIC ROUTES



load factor. However, the Eastern Air Lines' strike is estimated to have added approximately 3.0 points to the 1989 load factor.

Latin American load factors are forecast to decline to 61.6 percent in fiscal year 1991 and to remain at this level (61.3 to 61.5 percent) through 1994. Thereafter, load factors are forecast to increase gradually over the remainder of the 12-year forecast period. By fiscal year 2002, Latin American load factors are projected to average 63.0 percent, one point higher than the 1990 load factor.

Pacific Routes

Despite a doubling of transpacific capacity since 1986 (19.2 percent annually) and a 20.9 percent increase in 1990, U.S. scheduled airlines achieved a load factor of 71.4 percent in fiscal year 1990. This was 0.4 points higher than the previous high load factor (71.0 percent) recorded in 1988.

Despite the projected large capacity increases (9.1 percent annually) on the transpacific routes, load factors are projected to decline only slightly over the 12-year forecast period. Pacific load factors are forecast to decline to 70.0 percent (down 1.4 points) in 1991 and to 67.9 percent in 1994. Beginning in 1995, transpacific load factors are expected to increase gradually over the remaining seven years of the forecast period. Pacific load factors are forecast to average 69.1 percent in fiscal year 2002, 2.3 points below the load factor achieved in 1990.

AIR CARRIER FORECASTS

The forecasts of air carrier demand are based upon a specific set of assumptions, not the least of which are the economic and political climates in which they take place. There are a number of uncertainties which could drastically alter the short- and/ or long-term environment and cause the results to be significantly different from those forecast.

Some of the economic and/or political developments having the potential to significantly alter the forecast results include, but are not limited to, the following:

(1) the projected U.S. economic recession of two quarters could be deeper and/or of longer duration than expected;

(2) oil prices (projected to return to pre-Iraqi invasion prices during the latter half of fiscal year 1991) could be much higher (if supplies,refineries, and transportation facilities were destroyed) or could fall below the August level if OPEC becomes hopefully fragmented;

(3) the effects of the 'perestroika' (restructuring) process currently underway in the Soviet Union, the political/economic upheaval/rebuilding now taking place among Eastern Bloc countries; and the recent reunification of the two Germanies on the establishment of new travel markets to and from the United States; and

(4) the economic deregulation of the European Economic Community (EEC) scheduled to take place in 1992 and the impact that changes in Eastern Europe and a unified Germany will have on this process.

In addition to the above, the network of bilateral pacts that the U.S. currently has in place in Europe, the Far East, and South America could signifi-

cantly inhibit the expansion plans (current and future) of air carriers operating in these international regions and restrain traffic growth. Additionally, the United States may have to negotiate future bilateral route agreements with regional blocks (e.g. a single European market or a single Asian market) rather than with individual countries.

Three U.S. carriers (Continental, Eastern and Pan American) are currently operating under Chapter 11 bankruptcy protection. The possible liquidation of one or several large U.S. airlines could result in large numbers of used aircraft appearing on the open market. This could conceivably help to eliminate the industry's short-term overcapacity problem (relative to declining traffic demand) or it could open the way for new entrants (or financially solvent carriers) to skim traffic or increase market share in already depressed markets.

The projected downturn in economic growth and traffic could also result in U.S. carriers canceling or delaying the delivery of the aircraft now on order.

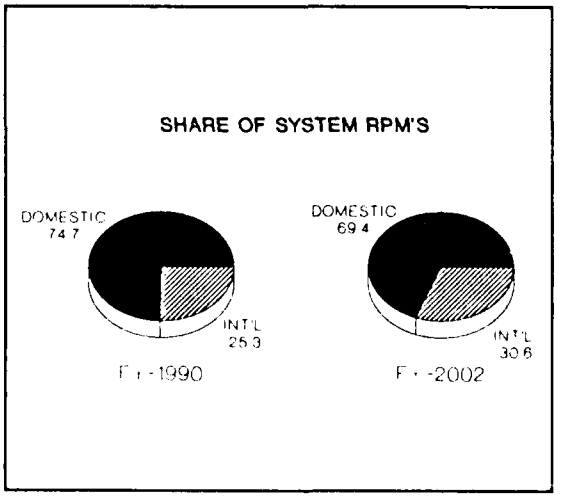
In addition, there is the ever present possibility of renewed terrorism in Europe and the Middle East, especially in light of the current situation in Iraq and Kuwait. Any renewal of terrorism, especially against U.S. airlines, could result in traffic losses in that particular region and shifts in traffic to other flag carriers and/or to other travel destinations.

In 1990, it was the rapid run-up in jet fuel prices (and subsequent escalation of air fares) that altered traffic results. Any of the factors discussed above have the potential to cause passenger traffic to differ from the forecast. However, the driving force, especially in the short-term, is what happens in the Iraqi conflict. The resolution (and timing) of this conflict holds the key to the future direction of oil prices, the direction of both U.S. and world economies, and, ultimately, the direction of traffic demand.

REVENUE PASSENGER MILES

U.S. scheduled air carriers recorded a total of 454.1 billion (up 5.8 percent) revenue passenger miles in fiscal year 1990. System passenger miles are forecast to increase to 456.4 billion (up 0.5 percent) in fiscal year 1991, to 481.3 billion (up 5.5 percent) in 1992 and to 507.9 billion (up 5.5 percent) in 1993. Over the 12-year forecast period, system RPM's are projected to increase at an average annual rate of 4.8 percent, reaching 794.3 billion in fiscal year 2002. However, following the small increase in traffic in 1991, system RPM's are projected to increase by 5.2 percent annually over the last 11 years of the forecast period.

The increase in system RPM's in 1991 and 1992 is almost entirely due to the relatively large increases forecast for international travel during the early years of the forecast period. International travel is also expected to



continue to outpace domestic travel over the entire 12-year forecast period, with RPM's growing at an annual rate almost 60.0 percent faster than

that forecast for domestic RPM's. International travel's share of the total U.S. travel market is expected to increase from its current 25.3 percent in 1990 to 30.6 percent in 2002.

Domestic Revenue Passenger Miles

Scheduled domestic passenger miles totaled 339.1 billion (up 3.2 percent) in fiscal year 1990. Domestic RPM's are projected to decline to 335.4 billion (down 1.1 percent) in 1991 and then increase to 348.8 billion (up 4.0 percent) in 1992. The decline in traffic growth in 1991 is due, in large part, to the expected downturn in the U.S. general economy and the large increases (up 8.0 percent) in air fares required by the rapid run-up in jet fuel prices. Additionally, 1991 and 1992 domestic traffic will be dampened by the increase in the airline ticket tax and the imposition of Passenger Facility Charges (PFCs) at U.S. airports.

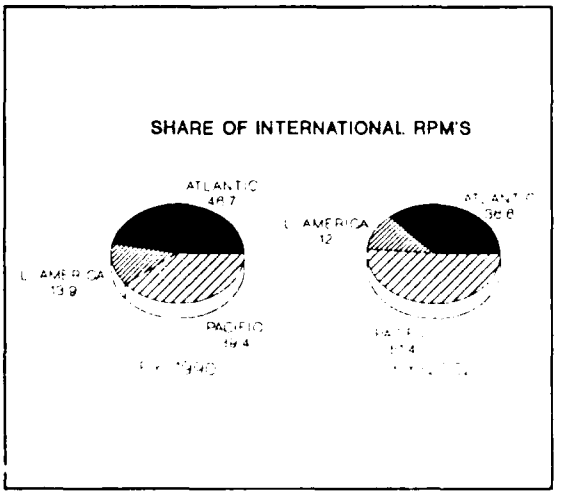
Beginning in 1993, however, the forecast is for considerably stronger domestic passenger demand over the remainder of the forecast period. Domestic RPM's are projected to total 551.5 billion in fiscal year 2002, an average annual growth rate of 4.1 percent over the 12-year forecast period. However, subsequent to the negative traffic growth in 1991, domestic RPM's are forecast to grow by 4.6 percent annually over the last 11 years of the forecast period.

International Revenue Passenger Miles

After experiencing unprecedented growth over the last four years (up 79.9 percent), the demand for international travel is expected to grow at more normal rates of growth over the 12-year forecast period. International RPM's are forecast to increase 5.2 percent (to 121.0 billion) in 1991. The relatively small growth in 1991 is due, in large part, to the recent run-up in oil prices. The higher oil prices result in slower growth in both the United States (down 0.5 percent) and world economies (up 2.3 percent), respectively) and considerably higher international air fares (up 8.6 percent).

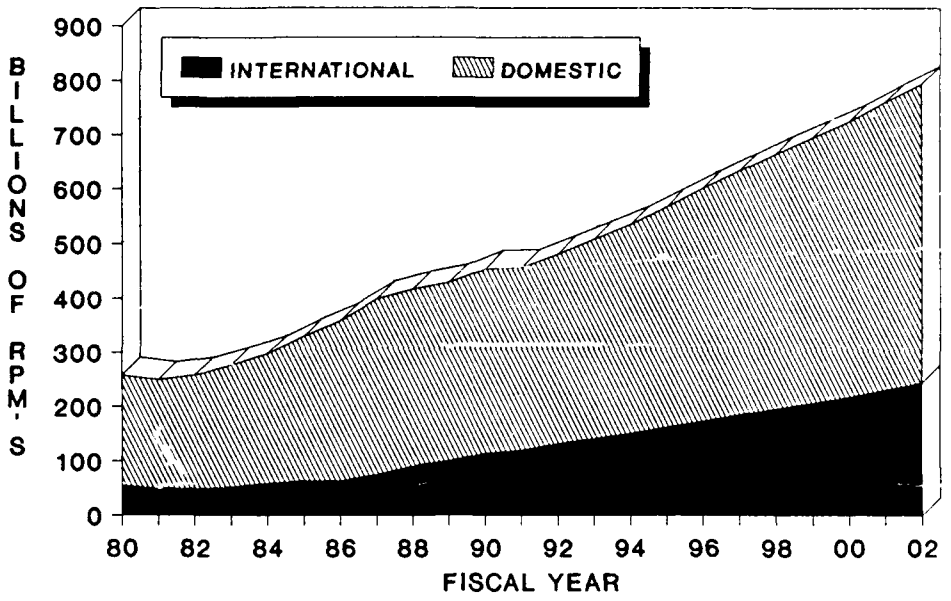
Stronger traffic growth is forecast to resume in 1992 (up 9.5 percent), with international RPM's projected to more than double (6.4 percent annually) over the 12-year forecast period. Scheduled international passenger miles are forecast to total 242.8 billion in fiscal year 2002.

In 1990, transatlantic RPM's (46.7 percent of scheduled international RPM's) accounted for the major share of all international traffic. However, the volume of traffic on the transpacific routes is expected to surpass trans-

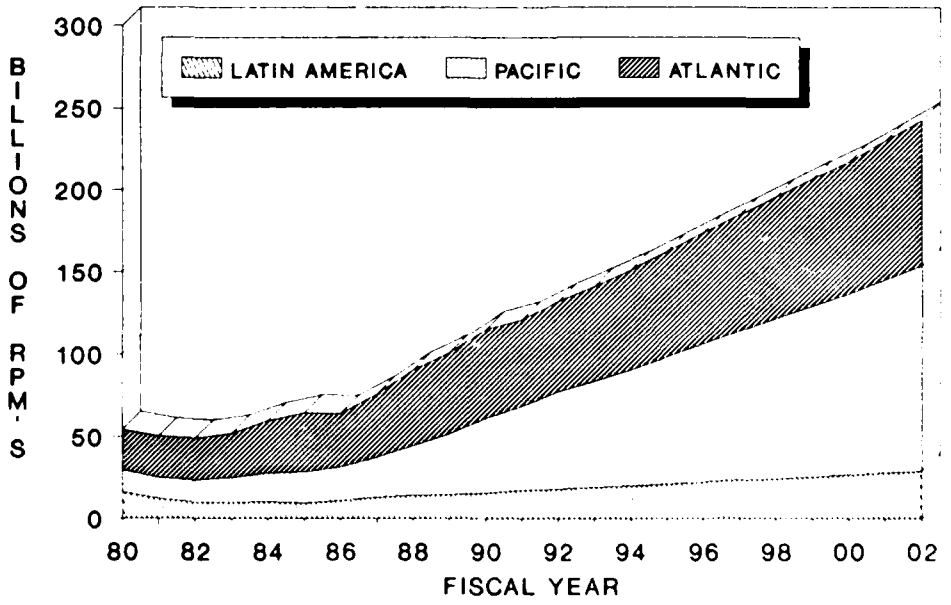


atlantic traffic levels in fiscal year 1992 (59.2 billion compared to 55.1 billion RPM's). By the year 2002, transpacific RPM's are projected to account for more than half (51.4 percent) of all scheduled international traffic, up from a 39.4 percent share in 1990.

U.S. COMMERCIAL AIR CARRIERS
SCHEDULED REVENUE PASSENGER MILES



SCHEDULED INTERNATIONAL RPMS
BY TRAVEL REGION



Atlantic Routes

Scheduled revenue passenger miles on the transatlantic totaled 53.7 billion (up 9.4 percent) in fiscal year 1990. Transatlantic passenger miles are expected to decline by 2.5 percent (to 52.4 billion) in 1991. This decline is due to a number of factors: (1) slower economic growth in both the United States (down 0.5 percent) and Europe (up 2.4 percent) which is expected to slow traffic demand on both sides of the Atlantic; (2) a 10.1 percent increase in passenger yields on transatlantic routes; (3) the fear of war/terrorism on the continent; and (4) the decline in the U.S. dollar relative to other European currencies (down 1.5 and 2.7 percent relative to the British pound and the German mark, respectively. While a declining U.S. dollar is likely to result in increased traffic flow between Europe to the United States, European carriers are expected to be the major benefactors of the increased traffic flow.

The speed with which the British Government acts to approve/disapprove the proposed sale of the Pan American and Trans World London-Heathrow route authority (to United and American) will have a bearing on traffic growth in 1991. The recent Chapter 11 bankruptcy of Pan American (January 1991) and the proposed merger with Trans World or some other carrier could also impact traffic in 1991 and beyond.

Stronger traffic growth on the transatlantic routes is expected to resume in 1992, averaging 4.9 percent annually over the last 11 years of the forecast period. Atlantic RPM's are forecast to increase to 55.1 billion (up 5.2 percent) in 1992 and to 57.9 billion (up 5.1 percent) in 1993. In 2002, Atlantic route RPM's are forecast to total 88.8 billion, an average annual growth rate of 4.3 percent over the 12-year forecast period.

Latin American Routes

Latin American passenger miles totaled 16.0 billion (up 8.7 percent) in fiscal year 1990. However, traffic in 1990 benefitted from the fact that the Eastern Air Lines' strike reduced traffic in 1989. Traffic in 1990 (and beyond) is expected to benefit from the sale of Eastern's Central and South American routes to American Airlines (effective June 1990).

The anticipated aggressive marketing of the new American South American service, combined with the announced increased service by Pan American, is expected to result in a 7.8 percent increase (to 17.2 billion) in Latin American RPM's in 1991, this despite a 7.0 percent increase in passenger yields and a general weakening of United States (down 0.5 percent) and Latin American (up 3.5 percent) economies. Of course, the recent Pan American bankruptcy could significantly alter their expansion plans and impact traffic growth in the region in 1991 and beyond.

Latin American RPM's are projected to increase by 5.8 percent in 1992 (to 18.2 billion) and by 5.5 percent in 1993 (to 19.2 billion). Latin American RPM's are forecast to total 29.1 billion in fiscal year 2002, an annual rate of growth of 5.1 percent over the 12-year forecast period.

Pacific Routes

Growth in passenger demand between the United States and the Pacific has more than doubled since 1985, with RPM's totaling 45.4 billion (up 23.2 percent) in fiscal year 1990. Passenger demand in the Pacific is expected to continue to exhibit strong growth throughout the entire forecast period (8.8 percent annually), although at somewhat lower rates than those observed over the past several years.

Three factors are largely responsible for the strong traffic growth projected for this international travel region over the next 12-years. The first of these factors is the relatively large growth that has been forecast for the economies of the Far East/Pacific Basin countries (real GDP up 4.5 percent annually). A second factor is the large increases in capacity (ASM's up 9.1 percent annually) that has been forecast as a result of the new Japan route authority that was awarded to U.S. carriers in 1990. Six new scheduled combination--passenger and cargo--services to the Far East from five U.S. cities. They are: Chicago - Tokyo (United), Los Angeles - Tokyo (Delta), San Jose - Tokyo (American), Honolulu - Nagoya (America West), Honolulu - Fukuoka (Hawaiian), and Portland - Nagoya (Delta).

A third factor responsible for the strong growth in the transpacific is the decline of the U.S. dollar (27.8 percent) relative to the Japanese yen over the 12-year forecast period. It is estimated that between 60 and 65 percent of U.S. traffic on the transpacific originates in the Far East countries. Therefore, as the U.S. dollar declines relative to the yen, all other things being equal, the cost of travel to the United States becomes cheaper.

Additionally, the sale of Continental's Seattle-Tokyo route authority (to American) and Hawaiian's Honolulu-Sydney and Guam/Saipan-Nagoya/Fukuoka route authority (to Northwest) will also impact traffic growth in 1991 and beyond.

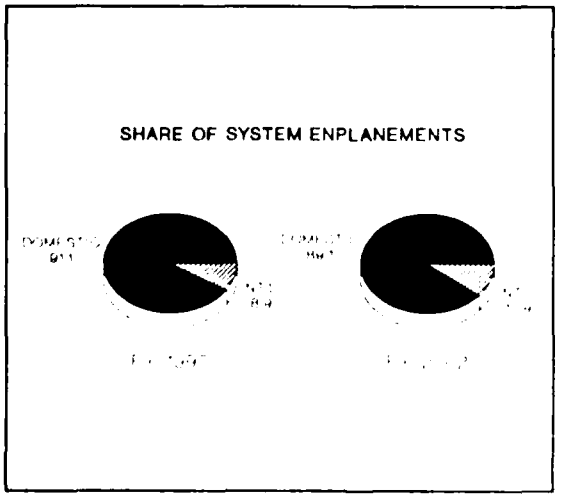
Transpacific RPM's are projected to increase to 51.4 billion (up 13.3 percent) in 1991 and to 59.2 billion (up 15.2 percent) in 1992. While traffic growth will be relatively slower over the remainder of the forecast period (7.8 percent annual growth), transpacific traffic is projected to increase by 8.8 percent annually over the entire 12-year forecast period. In fiscal year 2002, transpacific RPM's are forecast to total 124.9 billion.

PASSENGER ENPLANEMENTS

In fiscal year 1990, U.S. scheduled air carriers enplaned a total of 465.2 million (up 2.8 percent) passengers. The expected downturn in the U.S. economy, combined with large increases (up 7.9 percent in 1991) in air fares, is expected to result in a decline in passenger traffic in 1991. System passenger enplanements are forecast to decline to 462.5 million (down 0.6 percent) in 1991 but then increase to 481.7 million (up 4.2 percent) in 1992.

Over the 12-year forecast period, system enplanements are forecast to increase by an average of 4.0 percent per year, totaling 748.7 million passengers in fiscal year 2002. However, following the negative growth in 1991, the growth in system passenger enplanements averages 4.5 percent annually over the last 11 years of the forecast period.

International passenger enplanements are expected to grow more than 50.0 percent faster than domestic enplanements over the 12-year forecast period. Despite this relatively large



disparity in growth, international enplanements are expected to account for only 10.9 percent of all system enplanements in fiscal year 2002, up from 8.9 percent in 1990.

Domestic Passenger Enplanements

U.S. scheduled domestic air carriers enplaned a total of 424.0 million (up 2.0 percent) passengers in fiscal year 1990. The anticipated U.S. economic recession in 1991 is expected to result in negative growth in domestic passenger demand in 1991. Domestic passenger enplanements are forecast to total 419.3 million (down 1.1 percent) in 1991 and 434.9 million (up 3.7 percent) in 1992.

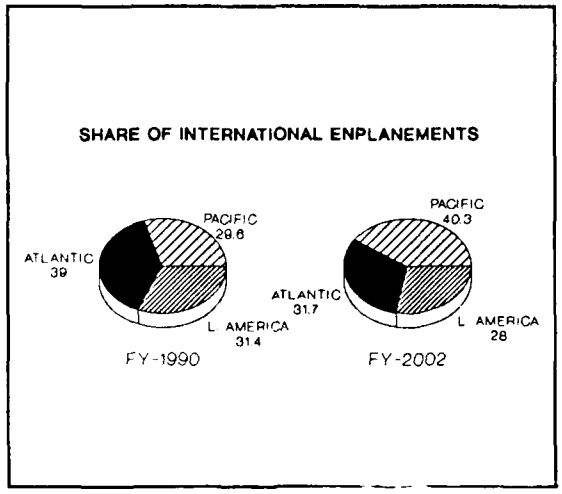
The projected growth in domestic enplanements is expected to average 3.8 percent annually over the 12-year forecast period, with the number of domestic enplanements reaching 666.9 million in fiscal year 2002. However, after the decline in passenger demand in 1991, the increase in domestic enplanements is 4.6 percent annually over the final 11 years of the forecast period.

International Passenger Enplanements

A total of 41.2 million (up 12.0 percent) passengers were enplaned by U.S. scheduled international airlines in fiscal year 1990. International enplanements are forecast to increase to 43.3 million (up 5.0 percent) in 1991 and to 46.8 million (up 8.2 percent) in 1992. The relatively slow growth in 1991 results from the slowing of both the United States and world economies and the projected 8.6 percent increase in passenger yields in that year.

The increase in the number of international passenger enplanements is expected to average 5.9 percent annually over the 12-year forecast period, totaling 81.8 million in fiscal year 2002.

In 1990, passenger enplanements on transatlantic routes accounted for the major share (39.0 percent) of all international passengers. However, the number of transpacific enplanements is projected to equal the number of



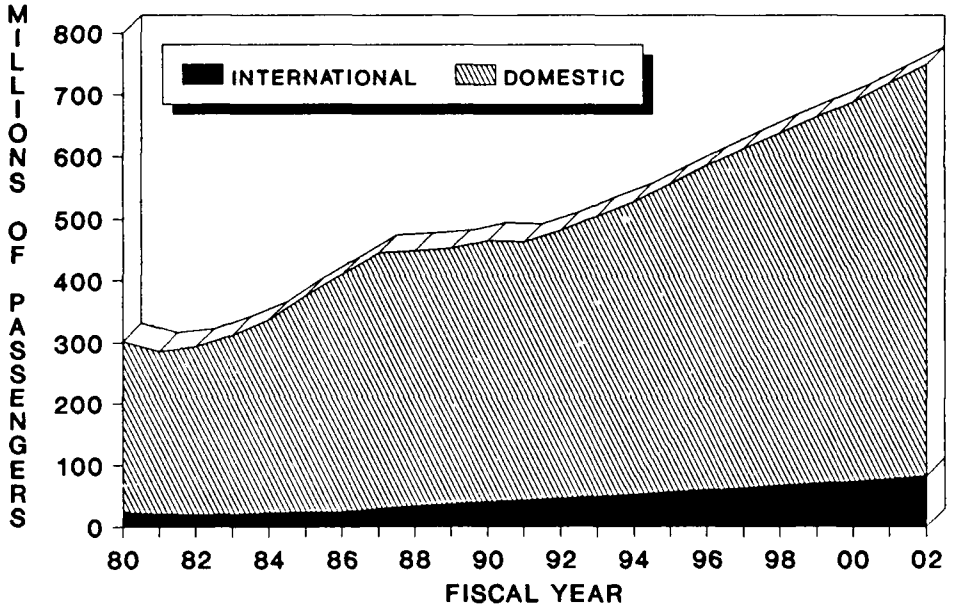
transatlantic passengers in 1993 and surpass them in 1994 (18.8 million compared to 17.9 million). In the final year of the forecast period, the transpacific routes are projected to account for 40.3 percent of all international passengers, up from a share of only 29.6 percent in 1990.

Atlantic Routes

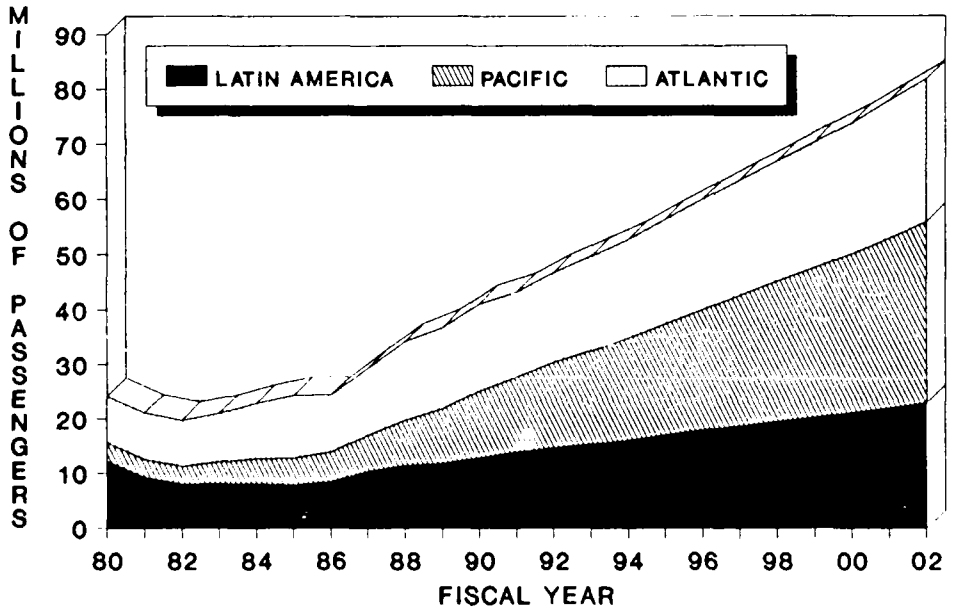
Passenger enplanements on the transatlantic routes totaled 16.1 million (up 7.1 percent) in fiscal year 1990. U.S. air carrier passenger enplanements on the transatlantic routes are forecast to decline by 2.9 percent (to 15.6 million) in 1991, the decline due, in large part, to the slowdown in both the United States and European economies and the projected large increase (10.1 percent) forecast in passenger yields.

Passenger demand on the transatlantic routes is expected to be considerably

U.S. COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER ENPLANEMENTS



SCHEDULED INTERNATIONAL ENPLANEMENTS
BY TRAVEL REGIONS



stronger in 1992, with the number of enplanements forecast to increase by 4.7 percent annually over the remaining 11 years of the forecast period. Enplanements are forecast to total 16.4 million (up 4.8 percent) in 1992 and 17.2 million (up 4.8 percent) in 1993. The projected annual rate of growth over the 12-year forecast period is 4.1 percent, with passenger enplanements on the Atlantic routes expected to total 25.9 million in fiscal year 2002.

Latin American Routes

U.S. scheduled airlines operating on the Latin American routes enplaned a total of 12.9 million (up 9.7 percent) passengers in fiscal year 1990. The number of passenger enplanements is projected to increase to 13.9 million (up 7.3 percent) in 1991 and to 14.6 million (up 5.4 percent) in 1992.

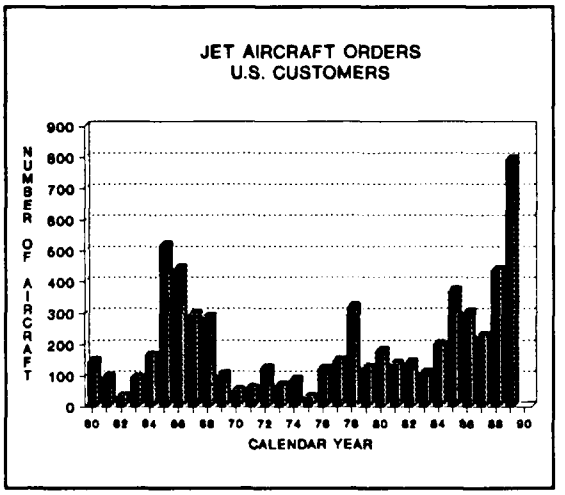
Between 1990 and 2002, the number of enplaned passengers traveling between the United States and Latin American destinations is forecast to increase by 4.9 percent annually, reaching a total of 22.9 million in fiscal year 2002.

Pacific Routes

Passenger enplanements on routes between the United States and Pacific destinations totaled 12.2 million (up 22.0 percent) in fiscal year 1990. Passenger enplanements are forecast to reach 13.7 million (up 13.0 percent) in 1991 and to 15.8 million (up 14.9 percent) in 1992. Over the 12-year forecast period, transpacific passenger enplanements are projected to increase at an average annual rate of 8.6 percent, totaling 33.0 million in fiscal year 2002.

AIR CARRIER FLEET

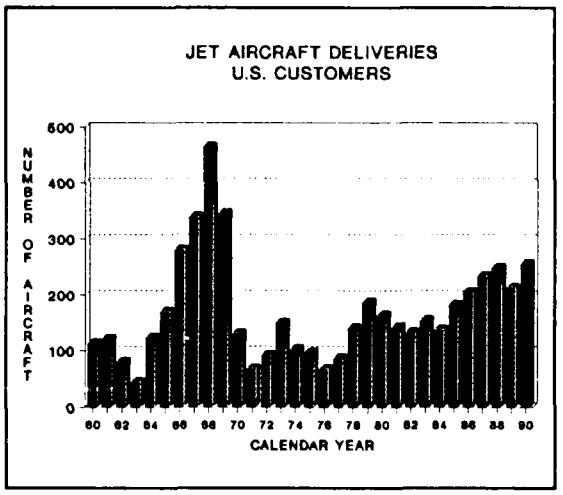
World air carriers placed an estimated 1,061 orders for large jet aircraft with U.S. and foreign aircraft manufacturers during 1990. Of this total, 693 (65.3 percent) were for two-engine narrowbody (B-737, B-757, MD-80, and F-



100) aircraft. As of December 31, 1990, U.S. and foreign aircraft manufacturers had a total world-wide backlog of 3,692 aircraft on order. Of the total backlog, 2,553 (69.2 percent) were for two-engine narrowbody aircraft.

U.S. air carriers ordered an estimated 392 aircraft in 1990, only 37.0 percent of the world-wide total. Since leasing company orders are classified according to the country in which the leasing company has its headquarters, the number of new aircraft orders destined for the U.S. airline fleet is understated. Of the total U.S. orders in 1990, approximately 75.8 percent (297 aircraft) were for two-engine narrowbody aircraft.

Aircraft manufacturers delivered approximately 670 large jet aircraft world-wide in 1990. Of this total, 502 (74.9 percent) were two-engine narrowbody aircraft. Deliveries to U.S. customers totaled 257 in 1990. Of this total, 89.1 percent (229 aircraft)

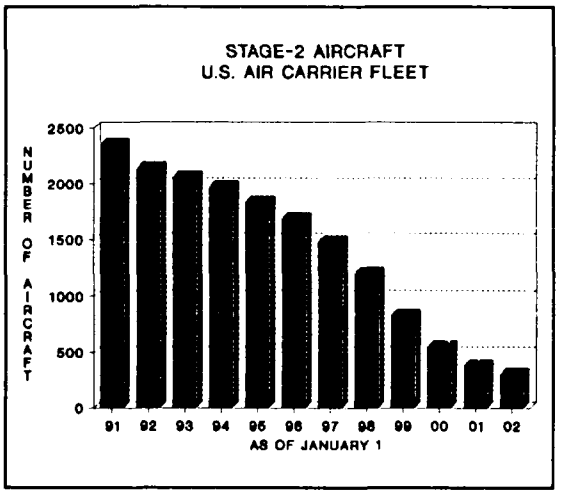


were two-engine narrowbody aircraft.

It is important to note that aircraft deliveries to U.S. air carriers during the past several years have been, for all intents and purposes, net additions to the U.S. fleet. This is due to the fact that U.S. airlines have retired very few of their older stage-2 aircraft. However, the recent run-up in jet fuel prices, in combination with the projected downturn in both the U.S. economy and passenger demand, is expected to put pressure on U.S. airlines to sell/ground or retire many of the smaller capacity, fuel inefficient stage-2 aircraft. Additional impetus will come from the recently enacted noise legislation.

Previous forecasts have assumed a 25-year life cycle for most stage-2 aircraft (except for those aircraft considered likely candidates for retrofit). This forecast, however, follows the guidelines proposed by the legislatively mandated national noise policy. Namely, that all stage-2 aircraft will be withdrawn from the U.S. fleet by the end of 1999, with waivers possible to delay retirement until December 31, 2003, if the individual air carriers have met 85 percent of the target by July 1, 1999, and the remaining 15 percent is on firm order.

At the end of 1990,there were approximately 2,363 stage-2 aircraft (58.5 percent of the total fleet) in the U.S. air carrier jet fleet. Rising fuel prices and declining traffic demand are expected to result in the re-



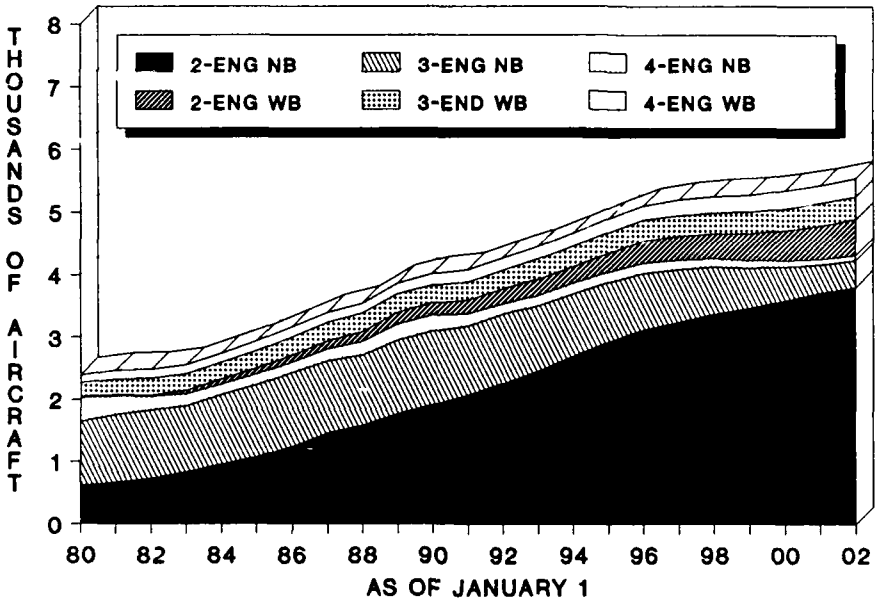
tirement/grounding of more than 200 stage-2 aircraft over the next 12-month period, with the number declining to 2,147 (50.3 percent) aircraft by January 1, 1992. Stage-2 aircraft are expected to account for only 10.5 percent (560 aircraft) of the U.S. fleet by January 1, 2000, the number of stage-2 aircraft declining further to 310 (5.6 percent) by January 1, 2002.

It should be noted, however, that the forecast assumes that 377 stage-2 aircraft are retrofitted to meet stage-3 noise standards. These aircraft are, for the most part, assumed to be operating as cargo aircraft. The forecast further assumes significant reductions in the utilization rates of the older stage-2 aircraft.

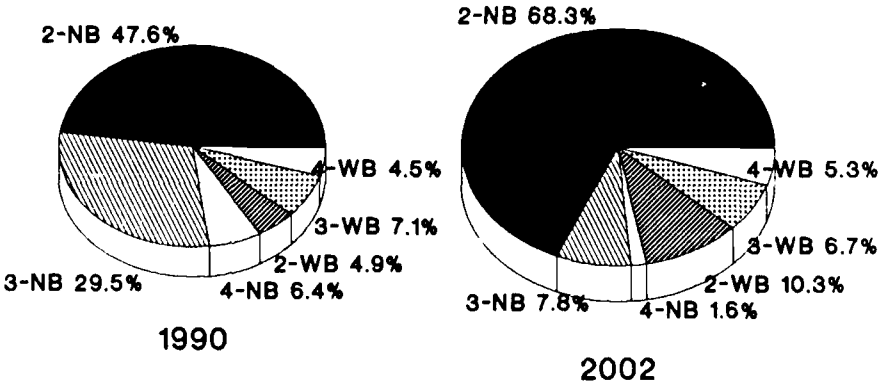
Based on the backlog of aircraft orders and the projections of air carrier traffic, seat capacity, load factors, and fleet retirements, the U.S. commercial air carrier fleet is projected to increase from an inventory of 4,017 large jet aircraft in January 1990 to 5,508 aircraft by 2002. This implies in the net addition (after retirements) of approximately 124 aircraft (2.7 percent) to the U.S. fleet each year. Over the next five years (1991 through the end of 1995), the U.S. fleet is forecast to grow by

U.S. COMMERCIAL AIR CARRIERS

LARGE JET AIRCRAFT



PERCENT BY AIRCRAFT TYPE



almost 206 aircraft (4.6 percent) annually, reaching a total of 5,108 aircraft. Thereafter, growth in the U.S. fleet slows to just over 66 aircraft (1.3 percent) annually over the remaining six years of the forecast period.

By far, the largest increase, in terms of number of aircraft, is projected to occur in the two-engine narrowbody aircraft category, which is expected to grow by an average of almost 155 aircraft (5.8 percent) annually. By the year 2002, two-engine narrowbody aircraft are expected to total 3,767 units and to account for 68.3 percent of the U.S. total fleet, up from 47.6 percent in 1990. This trend reflects the fact that the continued expansion and development of hub airports increases the importance of higher frequencies and the demand for aircraft with smaller capacities.

Three-engine narrowbody (B-727) aircraft (all stage-2), the mainstay of the U.S. air carrier jet fleet during the 1970's and early 1980's, are expected to decline from 1,185 aircraft (29.5 percent of the fleet) in 1990 to only 429 aircraft (7.8 percent) in the year 2002. The number of four-engine narrowbody (DC-8, B-707 and BA-146) aircraft is also expected to decline in absolute numbers over the forecast period, from 257 aircraft (6.4 percent) in 1990 to 107 aircraft (1.6 percent) in 2002.

Widebody aircraft, which accounted for only 16.5 percent of the U.S. fleet in 1990, are expected to account for 22.2 percent of the U.S. air carrier large jet fleet by 2002. Two-engine widebody (A-300, A-310, and B-767) aircraft, the fastest growing of all the aircraft groupings, are expected to increase by an average of almost 31 aircraft (9.2 percent) annually, from 197 aircraft in 1990 to 568 aircraft in 2002.

Four-engine widebody (B-747 and A-340) aircraft are forecast to increase from 184 aircraft in 1990 to 289 by 2002, an annual increase of 3.8 percent. The three-engine widebody category (MD-11, DC-10 and L-1011) is projected to grow from 283 aircraft in 1990 to 368 aircraft in 2002, an average annual increase of 2.2 percent.

AIRBORNE HOURS

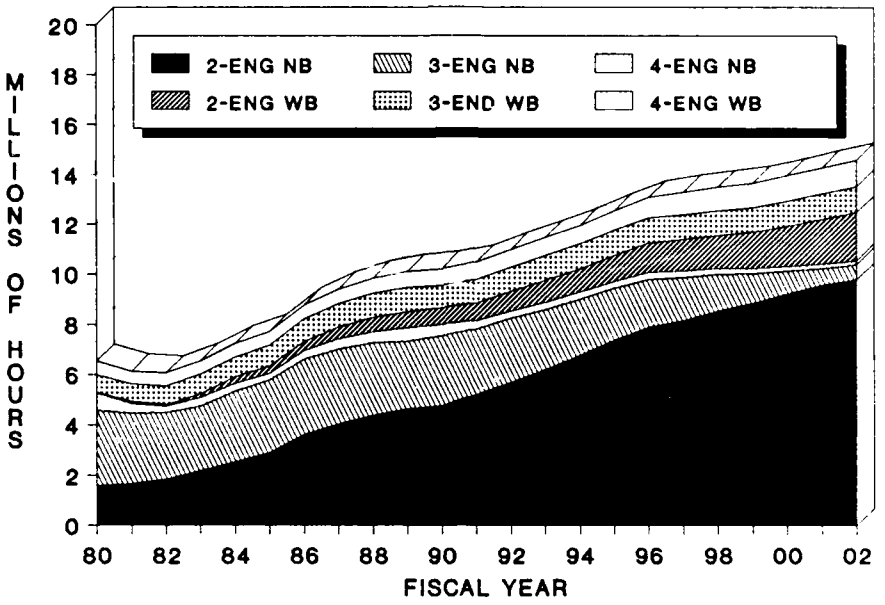
U.S. commercial air carriers flew an estimated total of 10.2 million hours in fiscal year 1990, an increase of 1.1 percent over 1989. Two aircraft categories accounted for the majority of these airborne hours: two-engine narrowbody aircraft (46.8 percent) and three-engine narrowbody aircraft (27.2 percent). In fiscal year 2002, the number of airborne hours is forecast to increase to 14.6 million, an average annual increase of 3.0 percent.

A large part of the growth in airborne hours (65.1 percent) is expected to occur during the first six years of the forecast period, reflecting the large numbers of smaller aircraft scheduled to be delivered to U.S. airlines during this period. In addition, hubbing activity is expected to continue to increase at many large and medium hub airports. The number of air carrier airborne hours is forecast to increase at an average annual rate of 4.2 percent between 1990 and 1996, then slowing to an average annual rate of 1.8 percent over the last half of the forecast period.

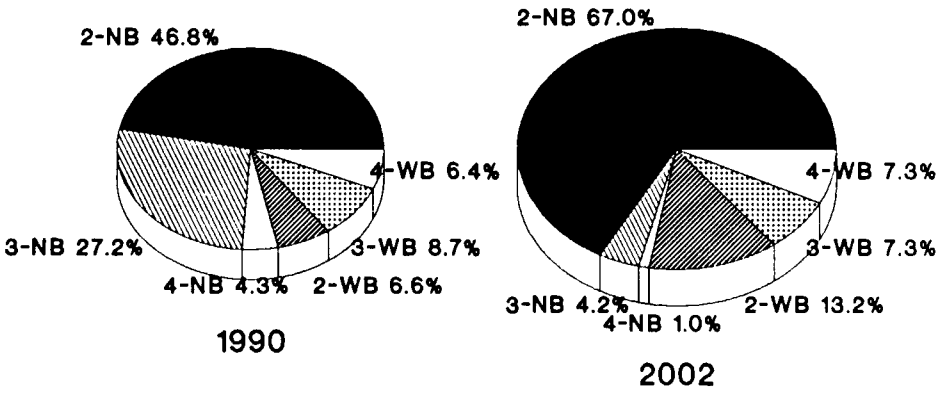
Two engine aircraft (both narrowboby and widebody) are projected to account for more than 80.0 percent of all airborne hours flown in fiscal year 2002. Two- engine narrowbody aircraft are expected to account for the vast majority of total hours (67.0 percent) in fiscal year 2002, increasing at an average annual rate of 6.1 percent over the 12-year forecast period. Airborne hours flown by two-engine widebody

U.S. COMMERCIAL AIR CARRIERS

AIRBORNE HOURS



PERCENT BY AIRCRAFT TYPE



aircraft are forecast to grow at an average annual rate of 9.2 percent over the same time period and account for 13.2 percent of total airborne hours in fiscal year 2002, up from only 6.6 percent in 1990.

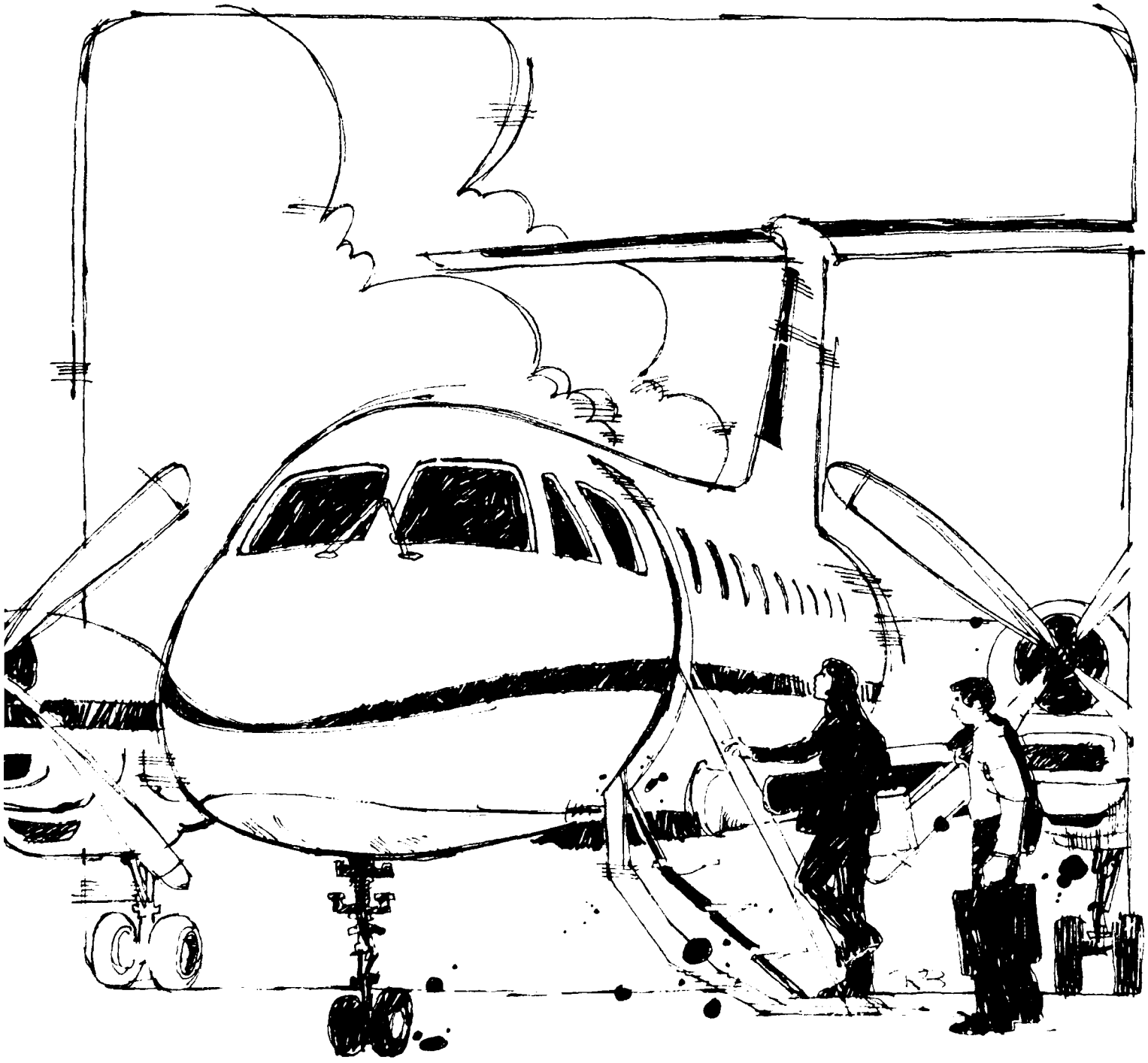
The number of hours flown by three-engine widebody aircraft is forecast to increase by 1.5 percent annually over the forecast period. However, its share of total hours declines from 8.7 percent in 1990 to 7.3 percent in fiscal year 2002. Four-engine widebody aircraft airborne hours will increase at an annual rate of 4.1 percent during the same period, accounting for 7.3 percent of total hours in fiscal year 2002, up from 6.4 percent in 1990.

Hours flown by two aircraft categories will decline significantly over the forecast period. The number of airborne hours flown by three-engine narrowbody aircraft will decline by 78.1 percent between 1990 and fiscal year 2002. This decline reflects not only the retirement of significant numbers of older stage-2 aircraft but also declining utilization rates of those aircraft still in service, many of which have been shifted to cargo service.

Hours flown by four-engine narrowbody aircraft are also forecast to decline significantly (down 66.0 percent) during the 12-year forecast period. In fiscal year 2002, this aircraft category is expected to account for only 1.0 percent of total U.S. air carrier airborne hours.

CHAPTER IV

REGIONALS/COMMUTERS



CHAPTER IV

REGIONALS/COMMUTERS

The regional/commuter airline industry, for the purpose of this forecast, is defined as those air carriers that provide regularly scheduled passenger service and whose fleets are composed predominantly of aircraft having 60 seats or less. During 1990, 151 regional/commuter airlines reported traffic data to RSPA on Form 298-C. (A listing of these carriers is presented in Appendix E, page 241). The FAA historical data base includes activity for all regional/commuters operating in the 48 contiguous states, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Excluded from the data base is activity in Alaska, other U.S. territories, and foreign territories. Additionally, the regional/commuter traffic statistics include duplicated data for selected operators included in the commercial air carrier traffic statistics. The duplication is for those air carriers operating both large jets (over 60 seats) and commuter type aircraft (see technical notes at the beginning of Chapter X for Table 10 and Table 19).

REVIEW OF 1990

Since 1984, the regional/commuter airline industry has been in a period of transition. In 1985, there was a dramatic growth in the number of code-sharing agreements with the major air carriers. This was followed in 1986 by a wave of large jet air carrier acquisitions of, or equity interest in, their regional/commuter code-sharing partners. These actions have resulted in a process of industry consolidation, increasing concentration, and increasing integration with the large commercial air carriers that has continued through 1990.

INDUSTRY SUMMARY

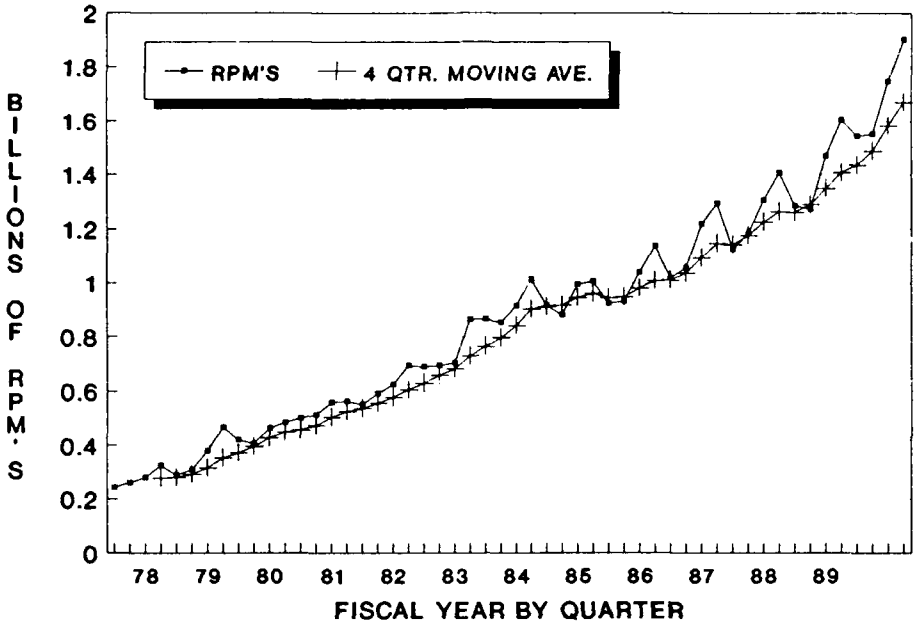
During fiscal year 1990, the number of regional/commuter airlines totaled 151, down from 160 in 1989. While the number of reporting airlines declined, industry growth continued to out-pace the growth of the major and national air carriers.

REVENUE PASSENGER ENPLANEMENTS

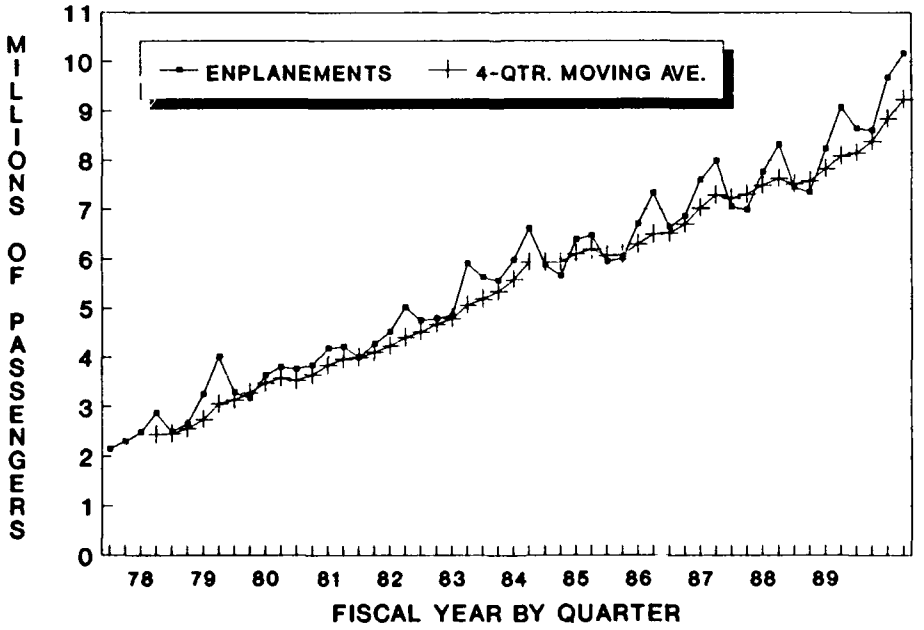
At the industry level, total revenue passenger enplanements for the regional/commuter airlines totaled 38.4 million, a 15.3 percent increase compared to 1989. As noted earlier, the data presented in this forecast include only activity for those carriers operating in the contiguous 48 states, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Not included is the traffic for carriers operating in Alaska and foreign territories. Excluding this traffic, enplanements totaled 37.1 million, up 15.6 percent

U.S. REGIONALS/COMMUTERS TRAFFIC TRENDS

REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



over 1989.

For the 48 states, enplanements increased 15.3 percent to 35.4 million. Enplanements in Hawaii, Puerto Rico, and the U.S. Virgin Islands totaled 1.7 million--a 27.7 percent increase compared to the previous year. Enplanements in Hawaii continued to drop, declining 9.0 percent compared to 1989. However, this does not reflect an actual decline in traffic, but rather a continuing shift from the commuter carrier group to the large commercial carriers following the failure of Mid-Pacific Airlines.

In contrast to Hawaiian traffic, enplanements in Puerto Rico and the Virgin Islands posted a dramatic increase of 44.1 percent. While not included in the forecast base, enplanements in Alaska and foreign territories totaled 1.3 million, an increase of 7.6 percent compared to 1989. Enplanements in Alaska were up 10.5 percent and all other areas increased 3.4 percent.

REVENUE PASSENGER MILES

Industry level revenue passenger miles totaled just over 7.0 billion in 1990, an increase of 20.5 percent from 1989. For the 48 states revenue passenger miles increased 20.4 percent in 1990 to 6.6 billion. The average passenger trip length increased by 7.3 miles to 186.6 miles. Passenger miles in Hawaii, Puerto Rico, and the Virgin Islands increased 13.6 percent to 142.3 million. The large differential growth in enplanements compared to passenger miles reflects the shorter average passenger trip length for the Caribbean traffic. In Alaska and other areas, revenue passenger miles totaled 256.6 million, an increase of 41.2 percent compared to 1989.

INDUSTRY COMPOSITION

During the mid 1980's and through today, the fundamental character of the industry has changed; from the relative size and sophistication of airline operations, the players involved (especially the dominant industry operators), and aircraft fleets, to the industry's relationship with the large commercial air carriers in the national air transportation system. While the role of the industry, in the past and today, is to provide feeder service to the large hubs served by the large commercial air carriers, the scope and formality of this role has changed dramatically.

In 1990 the composition of the regional/commuter airline industry continues to evolve. The factors contributing to this change include economic/competitive influences and marketing strategies and alliances. Since the mid 1980's two distinct but interrelated trends underlie the changing character and composition of the industry. They are industry consolidation and increasing integration of operations with the major and national air carriers.

INDUSTRY CONSOLIDATION

From a high of about 250 carriers in 1981, the number of regional/commuter operators has declined to 151 in 1990. The 151 operators in 1990 is a drop of 9 compared to 1989 when 160 carriers reported traffic data to RSPA. It should be noted that these counts are for all carriers which reported traffic during any part of 1989 and 1990, and thus include carriers which ceased operation at some point during both years. Of the 160 carriers which reported traffic data in 1989, 150 were in operation at the end of the year.

TOP 50

REGIONAL/COMMUTER AIRLINES

FISCAL YEAR 1990

1. WestAir	26. NPA
2. Henson	27. Trans States
3. Atlantic Southeast	28. Midway Commuter
4. Simmons	29. Command
5. Horizon	30. Aspen
6. Comair	31. Chautauqua
7. Bar Harbor	32. Chaparral
8. SkyWest	33. Sunaire
9. Business Express	34. Crown Airways
10. Express Airline I	35. Scenic
11. Metro-Flight	36. Aloha IslandAir
12. Wings West	37. Metro Northeast (ANA)
13. Nashville Eagle	38. Chalks/PIA
14. CCAir	39. Precision
15. Britt	40. Metro Northeast (CAP)
16. Pan Am Express	41. ERA Aviation
17. Rocky Mountain	42. Commutair
18. Mesaba	43. Conquest
19. Executive Air Charter	44. Great Lakes
20. Jetstream International	45. StatesWest
21. Air Midwest	46. Aero Coach
22. Allegheny Commuter	47. Viequies Air Link
23. Eastern Metro Express	48. Air Cape
24. Pennsylvania	49. Hermens
25. Mesa	50. Southcentral air

Source: RSPA Form 298-C and Form 41 enplanement data

TOP 30 CORPORATE STRUCTURES

Carrier/ Carrier Group	Percent of Industry Enplanements	Carrier/ Carrier Group	Percent of Industry Enplanements
1. American	13.9	16. Midway Commuter	1.4
2. Delta	12.3	17. Air Wisconsin/Aspen	1.3
3. USAir	11.5	18. Chautauqua	1.2
4. Metro	8.5	19. Crown Airways	1.0
5. Texas Air	8.1	20. Scenic Airlines	.9
6. WestAir	7.2	21. Aloha/Aloha IslandAir	.9
7. Alaska	4.6	22. Chalks/PIA	.8
8. Business Express	2.9	23. Precision	.6
9. Express Airline I	2.8	24. ERA Aviation	.5
10. CCAir	2.4	25. Commutair	.5
11. Pan Am Express	2.4	26. Conquest	.5
12. Northwest/Mesaba	2.4	27. Great lakes	.4
13. Air Midwest	2.0	28. StatesWest	.4
14. Mesa	1.6	29. Aero Coach	.3
15. Trans States	1.5	30. Viequies Air Link	.3

In 1990, of the total of 151 carriers, approximately 143 were still in operation at the end of the year. At the present time there is no reason to assume that this trend towards consolidation will not continue.

INDUSTRY CONCENTRATION

While the number of carriers has declined, the size of the dominant industry carriers has increased dramatically. This has resulted in increased industry concentration with the top 50 carriers accounting for approximately 96.0 percent of total industry passenger enplanements in 1990, up from 94.1 percent in 1989. At the industry level, enplanements increased by 15.3 percent in 1990, but the top 50 carriers grew by just under 18.9 percent. The top 50 carriers for 1990 are listed in the table on page 86. The relative ranks have changed for many carriers, but the composition of this group is relatively unchanged from 1989.

The above data are based on RSPA Form 298-C and Form 41 reporting entities. However, looking at the industry only in this manner does not reflect the true level of industry consolidation, concentration, and integration with the major and national air carriers. Many of the carriers are owned, totally or in part, by their larger code-sharing partners, and still others are owned by other regionals. A better picture of the current industry composition is presented by looking at the industry from a corporate structure point of view. A total of 21 regionals are owned, totally or in part, by 10 major

AIR CARRIER/COMMUTER AIRLINES CODE-SHARING AGREEMENTS

Air Carrier Program Name	Designated Commuter Carrier	Hubs Served
1. Alaska Airlines	Horizon*	Portland
		Seattle
2. Aloha Airlines	Aloha IslandAir	Honolulu
3. American Eagle	Chaparral	Dallas/Ft. Worth
	Command	Boston
		New York
	Executive Air Charter	San Juan
	Metro	Dallas/Ft. Worth
	Nashville Eagle	Miami
		Nashville
		Raleigh/Durham
	Simmons	Chicago
	Wings West	Los Angeles
		San Francisco
		San Jose
4. Continental Express	Britt	Cleveland
		Houston
	Bar Harbor	Boston
		Cleveland
		Newark
	Rocky Mountain	Denver
	Southern Jersey	Newark
5. Delta Connection	Atlantic Southeast	Atlanta
		Dallas/Ft. Worth
	Business Express	Boston
		New York
	Comair	Cincinnati
		Dayton
		Florida
	SkyWest	Los Angeles
		Salt Lake City
6. Eastern Express	Eastern Express	Miami
	Eastern Metro Express	Atlanta
	Aviation Associates	San Juan
	Southern Jersey	Philadelphia

AIR CARRIER/ COMMUTER AIRLINES CODE-SHARING AGREEMENTS (Continued)

Air Carrier Program Name	Designated Commuter carrier	Hubs Served
7. Midway Connection	Midway Commuter	Chicago Philadelphia
8. Northwest Airlink	Big Sky	Billings Helena
	Express Airline I	Memphis Minneapolis/St. Paul
	Horizon*	Portland Seattle
	Mesaba	Detroit Minneapolis/St. Paul
	Northeast Express	Boston
	Precision	Boston New York
9. Pan Am Express	Pan Am Express	New York Miami Philadelphia
	Resort Commuter	Los Angeles
10. Trans World Express	Air Midwest	St. Louis
	Metro Northeast	Boston New York
	Trans States	St. Louis
	Jet Express	New York
11. United Express	Aspen*	Denver
	Mesa	Denver
	NPA	Boise Portland Seattle
	WestAir*	Los Angeles San Francisco Washington, D.C.
12. USAir Express	CCAir	Charlotte
	Chautauqua	Orlando Pittsburgh
	Commutair	Boston New york Syracuse
	Crown	Pittsburgh

AIR CARRIER/ COMMUTER AIRLINES CODE-SHARING AGREEMENTS (Continued)

Air Carrier Program Name	Designated Commuter carrier	Hubs Served
12. USAir Express (Continued)	Crown	Pittsburgh
	Henson	Baltimore
		Charlotte
		Florida
	Jetstream	Baltimore
		Dayton
	Pennsylvania	Pittsburgh
		Philadelphia
	Allegheny Commuter	Pittsburgh
		Philadelphia
	StatesWest	Los Angeles
		Phoenix

* Carrier operates both large jet and commuter aircraft.

and national air carriers, and seven more are owned by three other regionals. The table on page 87 presents the top 30 corporate structures and their percent share of 1990 industry enplanements. Viewed in this manner, it can be seen that there is a much higher level of industry concentration, and also points out the degree of integration with the major and national airlines. In 1990, enplanements for these carriers grew by 19.0 percent and accounted for 95.2 percent of total industry enplanements.

FORECAST ASSUMPTIONS

Industry growth will continue to outpace that of the larger commercial air carriers and be driven by increased demand placed on a stable, mature regional/commuter airline industry. The introduction of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft will contribute to greater public acceptance and stimulate higher growth. Increasing integration of service with the majors and nationals, together with the introduction of new aircraft, will lead to further route rationalization programs by the majors opening new opportunities for growth for the regional/commuter airline industry. The average passenger trip length is expected to increase over the forecast period, but the industry will continue to serve primarily short-haul markets, with emphasis on improved quality and schedule frequency in the markets best suited to their operations.

It is expected that the aircraft fleet will continue to grow over the forecast period and the average seats per aircraft is expected to increase from 20.8 in 1990 to 34.3 in 2002, an average annual growth of 4.3 percent.

The average passenger trip length in the 48 States is projected to increase from 186.6 miles in 1990 to 214.0 miles in 2002, an average annual growth rate of 1.4 percent. The average trip length for Hawaii, Puerto Rico, and the Virgin Islands is expected to decline slightly from 83.7 miles in 1990 to 79.0 in 1993, increase to 81.0 in 1996, and remain constant through the balance of the forecast period.

The average industry load factor is expected to increase only slightly from 47.8 in 1989 to 48.8 in 2002 reflecting continued emphasis on frequency of service. A year-by-year detail of the above assumptions is presented in Table 18.

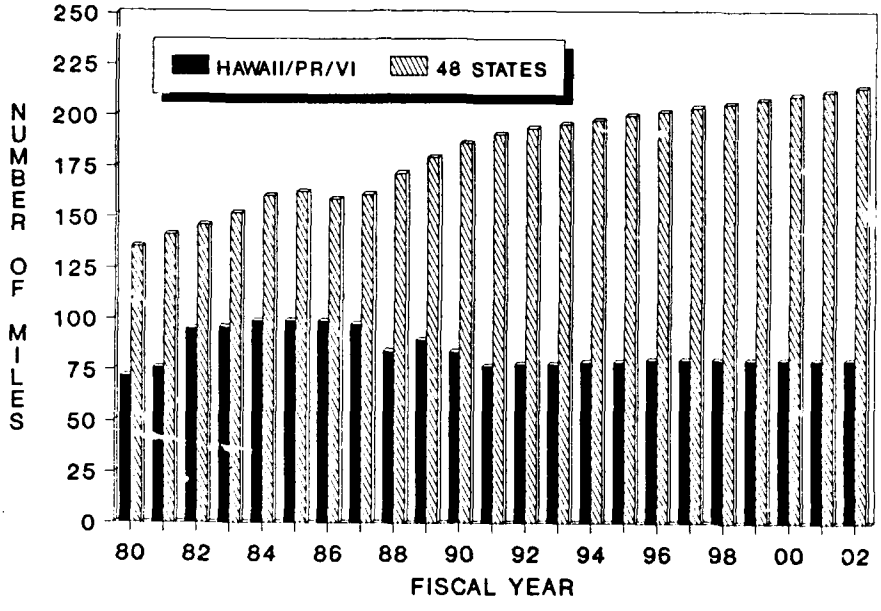
REGIONAL/COMMUTER FORECASTS

REVENUE PASSENGER MILES

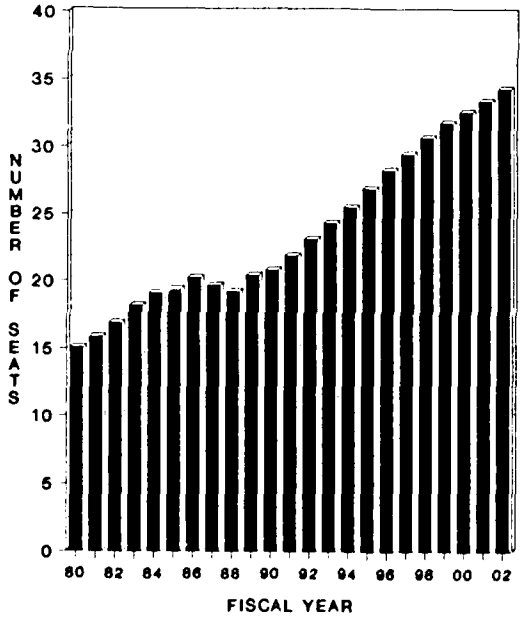
Revenue passenger miles are expected to total 16.2 billion in 2002. Passenger miles are projected to increase 9.1 percent in 1991 and 1992, and average 7.6 percent over the 12-year forecast period. Passenger miles in the 48 contiguous states are forecast to total 15.9 billion in 2002, increasing 9.0 percent in 1991 and 9.1 percent in 1992, and averaging 7.6 percent between 1990 and 2002. Traffic in Hawaii, Puerto Rico, and the Virgin Islands is forecast to increase by 13.8 percent in 1991, by 8.6 percent in 1992, average 8.2 percent growth over the forecast period, and total to 364.5 million passenger miles in 2002.

U.S. REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

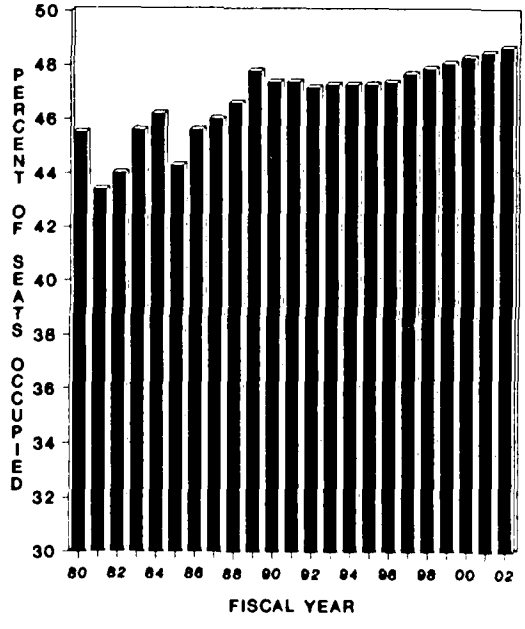
PASSENGER TRIP LENGTH



AVERAGE AIRCRAFT SIZE



PASSENGER LOAD FACTOR



REVENUE PASSENGER ENPLANEMENTS

Passenger enplanements are forecast to reach 78.6 million in 2002, more than double the 1990 enplanements. Overall, passenger enplanements are expected to increase by 7.0 percent in 1991 and 7.6 percent in 1992, and average 6.5 percent growth annually during the forecast period.

In the 48 states, passenger enplanements are projected to increase 6.5 percent in 1991, 7.4 percent in 1992, and average 6.3 percent growth between 1990 and 2002, and total 74.1 million in 2002. Enplanements in Hawaii, Puerto Rico, and the Virgin Islands are projected to total 4.5 million in 2002, increasing by 17.6 percent in 1991 and 10.0 percent in 1992, and average 8.5 percent over the 12-year forecast period.

REGIONAL/COMMUTER FLEET

The current composition of the regional/commuter fleet underscores the growth of the industry and quality of service provided. From a fleet once composed predominantly of general aviation type aircraft, today's fleet is increasingly composed of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft. Today, regional/commuter airlines have a large variety of aircraft from which to choose to create a fleet tailored to the specific markets they serve.

While there are numerous models to choose from in the categories presented in this forecast, the most significant are the new aircraft in the larger seat size categories, primarily "20 to 40 seats" and "greater than 40 seats." The impact of the introduction of the larger new aircraft is reflected in the growth of the average seats per aircraft from 11.9 in 1980 to 20.8 in 1990, an increase of 74.5 percent while the fleet grew by 26.1 percent during the same time period.

Over the forecast period, it is projected that the average seats per aircraft will grow at a rate significantly higher than the fleet, reflecting the continued introduction of larger aircraft. The fleet is projected to grow at an average annual rate of 1.8 percent, increasing from 1819 units in 1990 to 2,264 in 2002. During this time the average seats per aircraft is projected to increase at an average annual rate of 4.3 percent, increasing from 20.8 in 1990 to 34.3 in 2002.

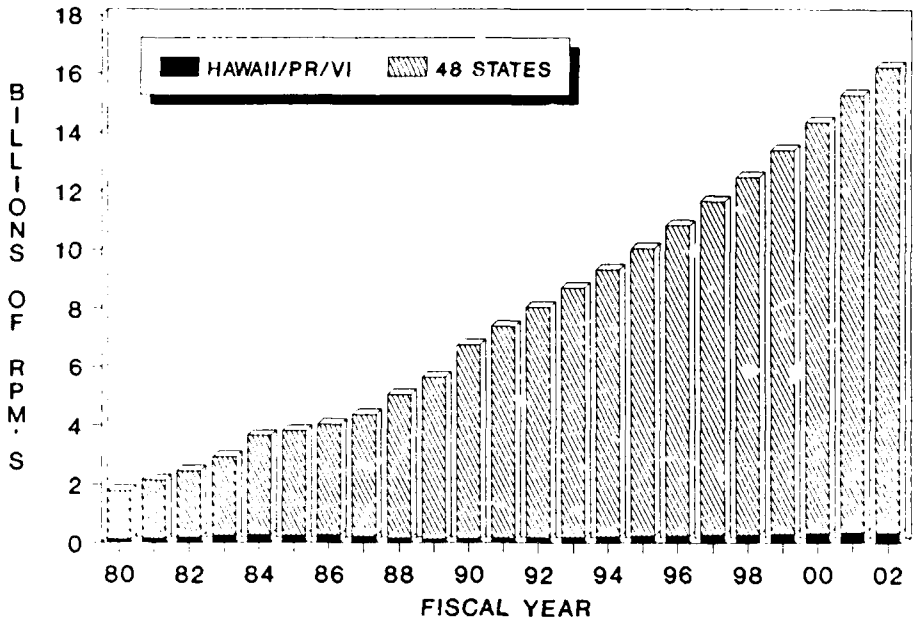
The number of aircraft having under 15 seats, which once made up the bulk of the fleet, increased slightly in 1990. In 1990 this group made up 29.7 percent of the fleet. This group is projected to decline throughout the forecast period. Between 1990 and 2002, the number of aircraft in this category is expected to decline from 541 to 155, a drop of 71.3 percent. By the year 2002 it will represent only 6.8 percent of the total fleet.

In 1990, the "15 to 19 seats" category accounted for the largest portion of the fleet at 41.9 percent. Over the last 10 years, most of the growth of the regional/commuter fleet has been in this group of aircraft. During the forecast period, this group is expected to continue to grow through 1994 and decline thereafter. It is projected that the "15 to 19 seats" category will then drop approximately 11.9 percent by 2002 compared to 1990, but will still account for just under 30 percent of the fleet.

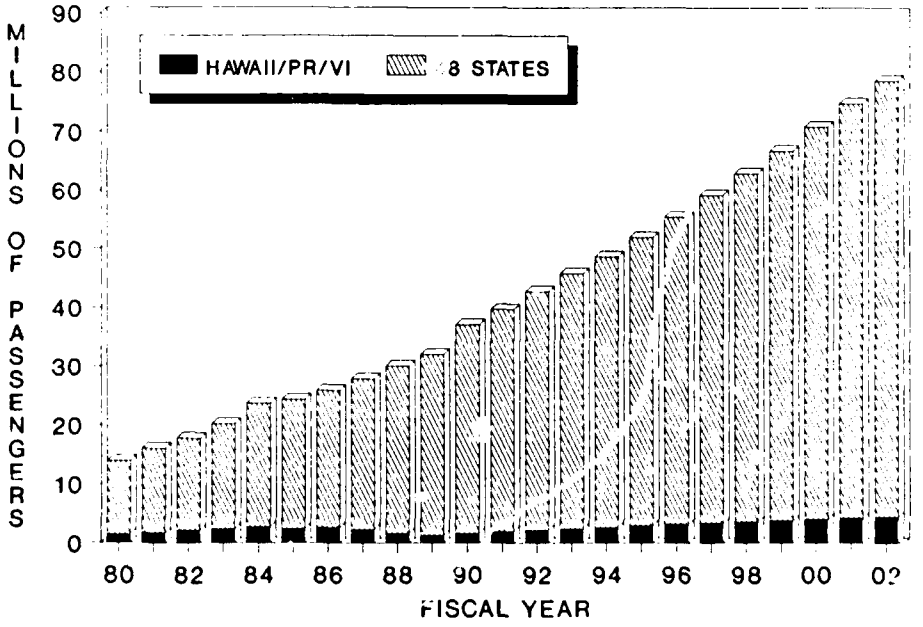
The greatest growth in the fleet will be in the "20 to 40 seats" and "greater than 40 seats" categories. In 1990, the "20 to 40 seats" category accounted for 20.1 percent of the fleet while the "greater than 40 seats" accounted for

U.S. REGIONALS/COMMUTERS

SCHEDULED REVENUE PASSENGER MILES

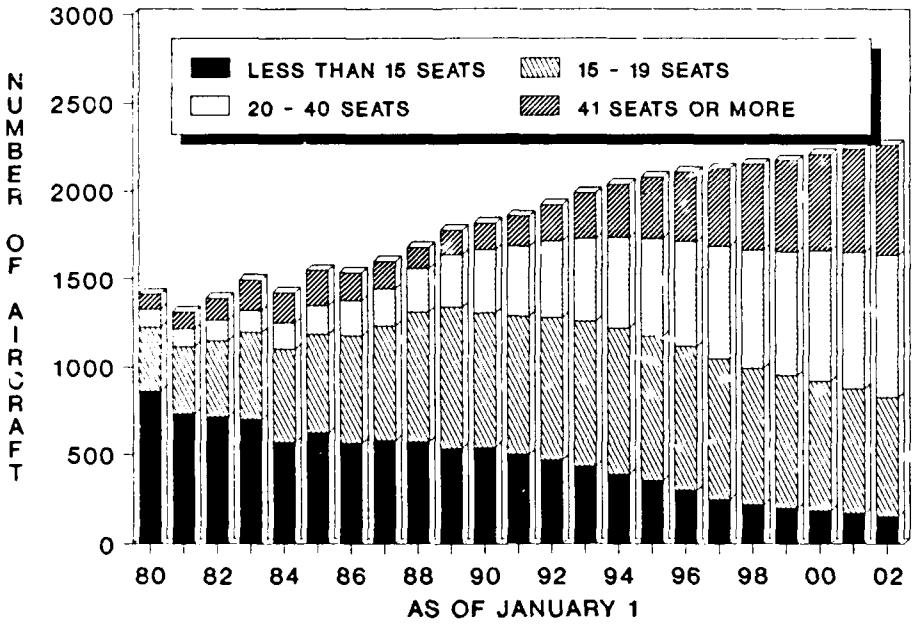


SCHEDULED PASSENGER ENPLANEMENTS

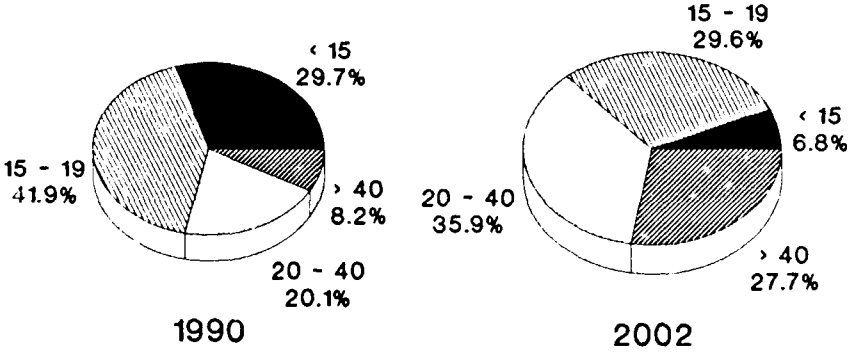


U.S. REGIONALS/COMMUTERS

PASSENGER AIRCRAFT



PERCENT BY AIRCRAFT SEAT SIZE

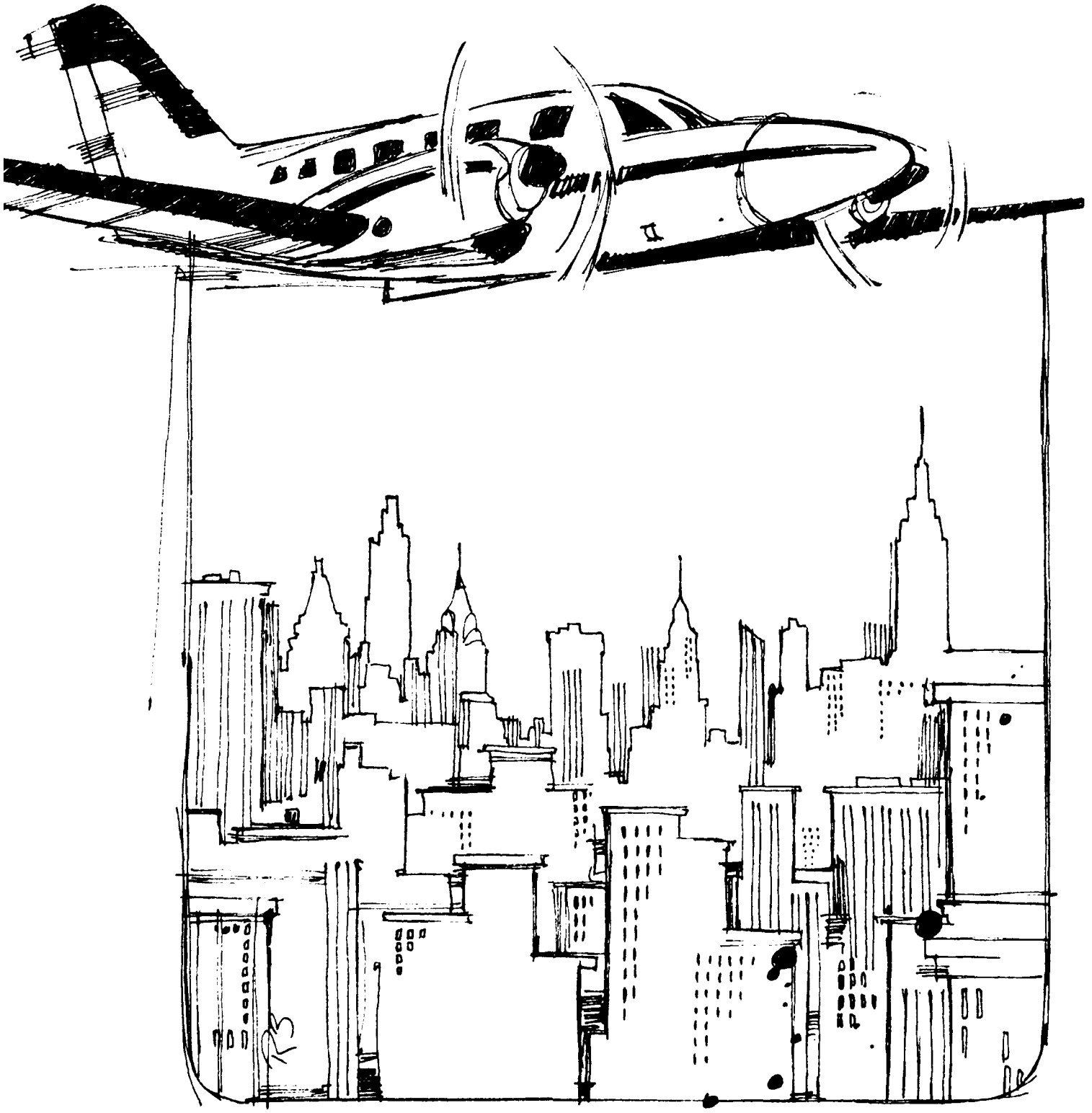


8.2 percent. By the year 2002, these two categories are expected to account for 63.5 percent of the total fleet, with 35.9 percent being in the "20 to 40 seats" category and 27.7 percent in the "greater than 40 seats" category. During the forecast period, aircraft in the "20 to 40 seats" category are expected to increase from 366 aircraft in 1990 to 812 in 2002, an average annual increase of 6.9 percent.

Aircraft in the "greater than 40 seats" category are expected to increase from 150 in 1990 to 626 in 2002, an average annual growth of 12.6 percent.

CHAPTER V

GENERAL AVIATION



CHAPTER V

GENERAL AVIATION

General aviation is an important component of both the aviation industry and our national economy. It provides aviation services that commercial aviation cannot or will not provide, while the production and sale of general aviation aircraft, avionics, and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance, and insurance, make the general aviation industry an important contributor to the nation's economy. Unfortunately, the health of the general aviation industry is mixed.

Although shipments of single engine piston aircraft declined in 1990 (down 40.6 percent), the general aviation manufacturing industry exhibited some positive signs with billings increasing by 11.3 percent, from $1.8 billion to over $2.0 billion. As reflected in the charts on page 100, there has been a drastic decline in shipments (from 17,811 units in 1978 to 1,144 units in 1990) of all types of general aviation aircraft. However, factory net billings have never declined to the extent experienced by unit shipments. This implies that the market for the larger, more expensive aircraft used primarily for business has remained relatively healthy.

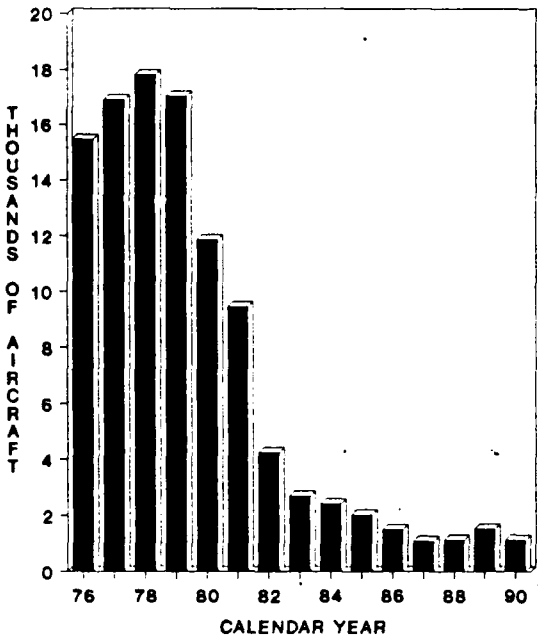
The general aviation export market represents 38.6 percent of units shipped and net export billings were 42.0 percent of total billings. These figures reflect signs of substantial recovery. Export billings increased by 43.8 percent during 1990, from $587.0 million to $843.8 million.

There is still some cause for concern, however, as the single engine piston aircraft market is the base on which general aviation activity builds. Historically, new pilots are trained in single engine piston aircraft and work their way up through retractable landing gear and multi-engine piston to turbine aircraft. When the single engine piston market declines, as it has since 1978, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at some FAA facilities.

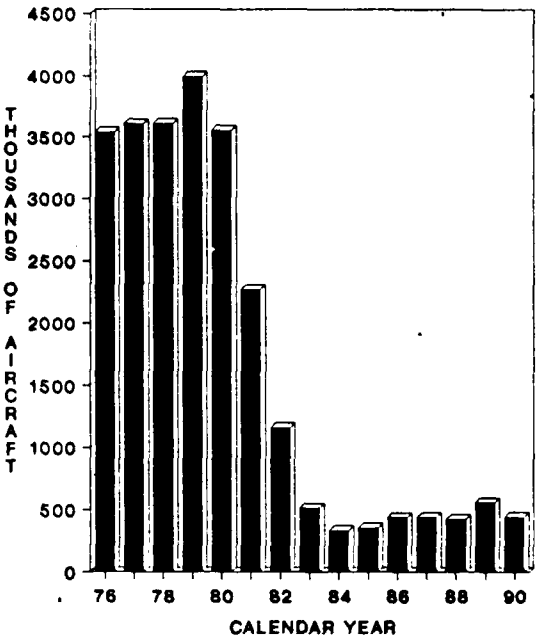
A number of reasons have been advanced for this, chiefly rapid price increases (see graphics on pages 105 through 108), high interest rates, and expensive fuel--even though the real price of fuel fell at an annual rate of 0.7 percent 1978 and 1990. A portion of the price increases can be attributed to massive awards assessed against manufacturers in product liability lawsuits which triggered extreme increases in liability insurance premiums, driving up manufacturers' costs. However, with further congestion and delay developing at major air carrier airports as the commercial industry expands, the demand for business general aviation may be increasing.

GENERAL AVIATION SHIPMENT/EXPORT TRENDS

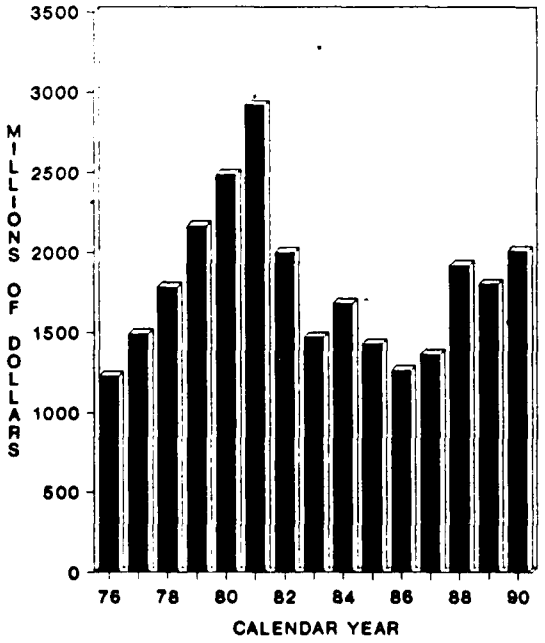
TOTAL UNITS SHIPPED



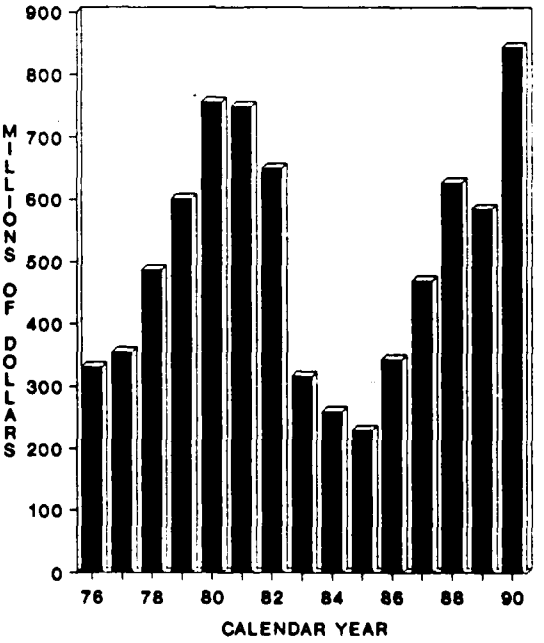
UNITS EXPORTED



TOTAL FACTORY NET BILLINGS



FACTORY NET EXPORT BILLINGS



Realizing that the general aviation industry faces new challenges and opportunities, the FAA has instituted a new forum to consult with the industry--the First Annual FAA General Aviation Forecast Conference, March 7, 1991, Denver, Colorado. This conference will be held in the late winter or early spring each year and will bring together industry experts to obtain their informed judgments on future trends and developments in the industry. This conference seeks to open new avenues of communication for the FAA with this significant segment of the aviation community to assure that the FAA meets general aviation demand in a way that provides safe and efficient transportation for those who use and depend upon the National Airspace System.

General aviation is the term used to describe all of the segments of the aviation industry, except for air carrier and military. It describes a diverse range of aviation activities from the training of beginning pilots to the long range jet transportation of executives. It includes agricultural flying, air taxis, and pleasure flying.

Just as the activities of general aviation are dissimilar, so are the reasons that motivate general aviation activity, many of which are not economic. It has been extremely difficult to forecast measures of general aviation activity in recent years because the relationships between measures of general aviation activity and the traditional economic variables are no longer valid. The FAA Forecast Branch has deemed it necessary to review the general aviation forecasting methodology in order to develop a better understanding of the changing environment in which the industry operates.

A review was initiated in fiscal year 1990 to address this task. Though not yet completed, initial findings appear to suggest that segmentation may be important for analysis and that perhaps the pilot population should be divided into compensated and uncompensated flying. Further, use of delphi intervention may be appropriate in order to get input from general aviation experts to adjust forecasts. Pilot population cohort and time series analyses may also have merit. Medical records may also be a good way to deal with pilot information, from which hours flown and fleet might be estimated. This might avoid sampling problems that we currently have with the aircraft register and the avionics survey. The graphs on page 102 reflect the consistency of data obtained from Pilot Medical Records.

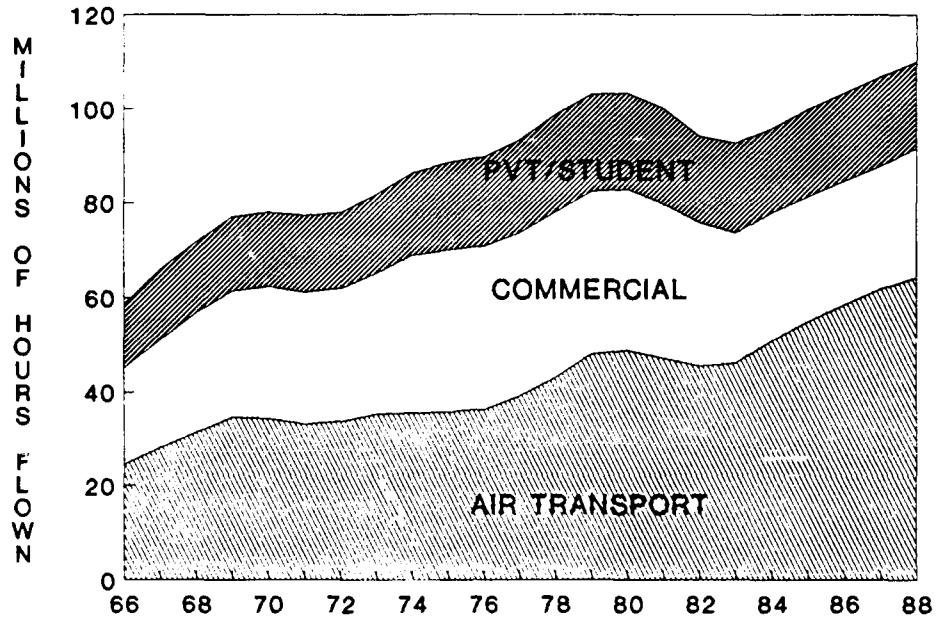
REVIEW OF 1990

FLEET COMPOSITION AND AIRCRAFT SHIPMENTS

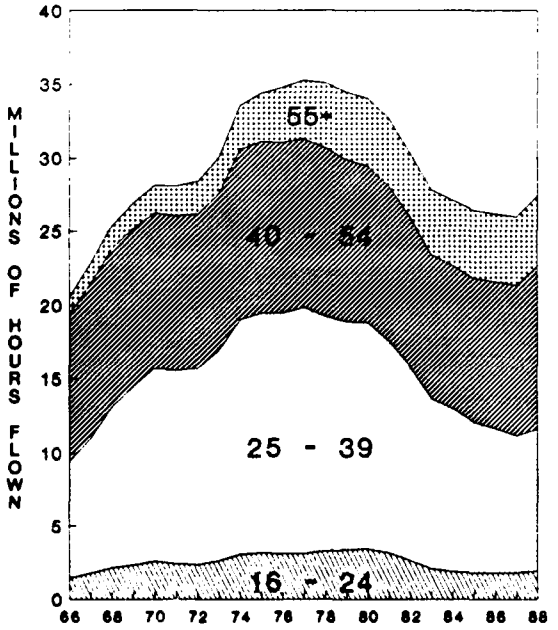
The total active general aviation fleet increased 4.5 percent in 1990. (The "active fleet" consists of any aircraft flown at least one hour during the previous year, as reported by the registered owner in a sample survey of general aviation activity.) As of January 1, 1990, the general aviation active fleet consisted of 219,737 aircraft. This compares to 210,266 aircraft in 1989. The single engine piston active fleet increased from 164,760 to 170,370 (up 3.4 percent); the multiengine piston fleet increased from 22,797 to 23,445 (up 2.8 percent); the turboprop fleet increased from 5,259 to 6,324 (up 20.3 percent); and the turbojet fleet increased from 4,187 to 4,402 (up 5.1 percent). The number of active rotorcraft (piston and turbine helicopters) was up 16.7 percent in 1990, from 6,406 to 7,475. In addition, the active general aviation fleet includes an "other category," which consists of 7,721 gliders and lighter-than-air aircraft (blimps, dirigibles, and balloons). Due to sampling errors, the

ANNUAL HOURS FLOWN

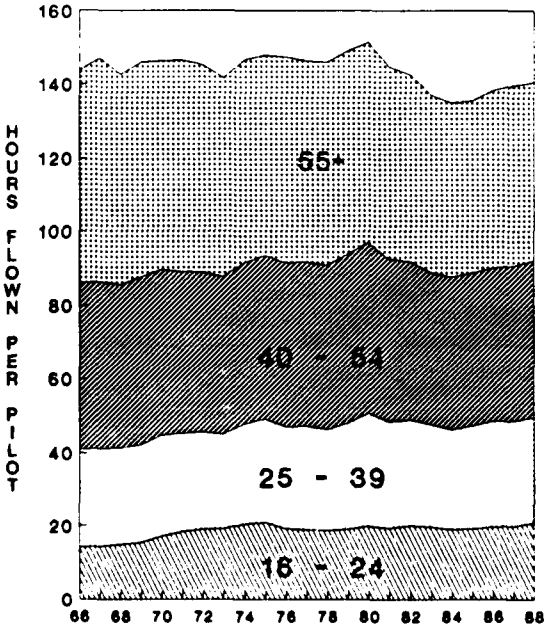
PILOTS BY MEDICAL CLASS



COMMERCIAL PILOTS BY AGE



PRIVATE/STUDENT PILOTS BY AGE



size of the active fleet may vary significantly from year to year, with most of this variation in single engine piston aircraft which currently accounts for 83.3 percent of the fixed wing fleet.

Although single engine piston shipments declined in 1990 (down 25.5 percent) and multi-engine piston aircraft shipments remained constant, the more sophisticated business oriented portion of the general aviation fleet posted gains. Turboprop aircraft shipments increased from 268 to 281 units (up 4.9 percent), and turbojet aircraft shipments increased from 157 to 168 (up 7.0 percent).

Exports decreased from 566 units in 1989 to 442 units in 1990, a decline of 21.9 percent. As stated earlier, however, net export billings increased from $587.0 million in 1989 to $843.8 million in 1990, an increase of 43.8 percent. This reflects the strength of the larger, business oriented fleet in the export market as well as in the domestic market. These opposite trends in 1990--exports down, billings up--reflect the increase in per unit value of aircraft exported in 1990. As always, the general aviation export market is highly dependent on the price of aircraft, the rates of exchange with the U.S. dollar, and national and international economic growth.

HOURS FLOWN

Total hours flown were up over the previous year by 2.1 percent. Total hours flown increased from 34.7 million in 1989 to 35.4 million in fiscal year 1990. Hours flown in single engine piston aircraft increased 0.8 percent, hours flown in multi-engine piston aircraft increased 1.5 percent, hours flown in turboprop aircraft increased 12.0 percent, and hours flown in turbojet aircraft increased 4.8 percent. It is believed that the increases in hours flown in turboprop and turbojet aircraft reflect the increased business usage of general aviation aircraft, as well as increased regional/commuter and air taxi operations.

It is also important to note that hours flown by piston and turbine powered rotorcraft increased from 2.8 to 2.9 million, an increase of 3.7 percent. This follows strong growth in the previous year of 7.5 percent. Clearly, these rates of growth suggest continuing strong growth for piston and turbine powered rotorcraft flying--growth that may well continue once we recover from the current economic downturn.

PILOT POPULATION

As of January 1, 1990, the total pilot population was 700,010. This was 5,994 more pilots than a year earlier when the pilot population was 694,016, an increase of 0.9 percent. The pilot population consists of four major groups: student, private, commercial, and airline transport. Three of the four groups increased during the previous year: student pilots increased from 136,913 to 142,544 (up 4.1 percent); commercial pilots increased from 143,030 to 144,540 (up 1.1 percent); and airline transport increased from 96,968 to 102,087 (up 5.3 percent). The number of private pilots declined 2.2 percent in 1990, from 299,786 to 293,179. In addition, there are three other small categories (helicopter, glider, and lighter-than-air), which accounted for 17,700 pilots in 1990.

These changes follow the trends of previous years, reflecting the strong demand for airline transport pilots and the declining interest in, or ability to afford, recreational and private flying. The declines in recreational and private pilots bodes poorly for the

commercial air carriers in the future, as the demand for commercial pilots is estimated to increase substantially. Just where these seasoned, experienced pilots will come from remains a big question mark, especially since the military is expected to make increased efforts to retain its experienced pilots. In the short-run, however, resolution of the Iraqi crisis could result in reductions to the military budget, with a concurrent reduction in the number of military pilots.

DISCUSSION OF FACTORS AFFECTING GENERAL AVIATION

This section discusses three factors which affect the demand for general aviation activity: general growth in the economy, cost factors, and the deregulation of the commercial airline industry.

GENERAL ECONOMIC GROWTH

Fundamental changes may have taken place in the general aviation industry. Prior to 1978, changes in the general aviation industry generally paralleled changes in business activity. If business activity was up, so was general aviation. If down, so was general aviation. However, since the long and precipitous decline of aircraft shipments began in the late 1970s, this expected relationship has not held.

Some of the declines during years of generally robust economic growth can probably be attributed to higher costs relating to the purchase, operation, and insuring of aircraft. An additional factor is the increased product liability of the manufacturers.

COST FACTORS

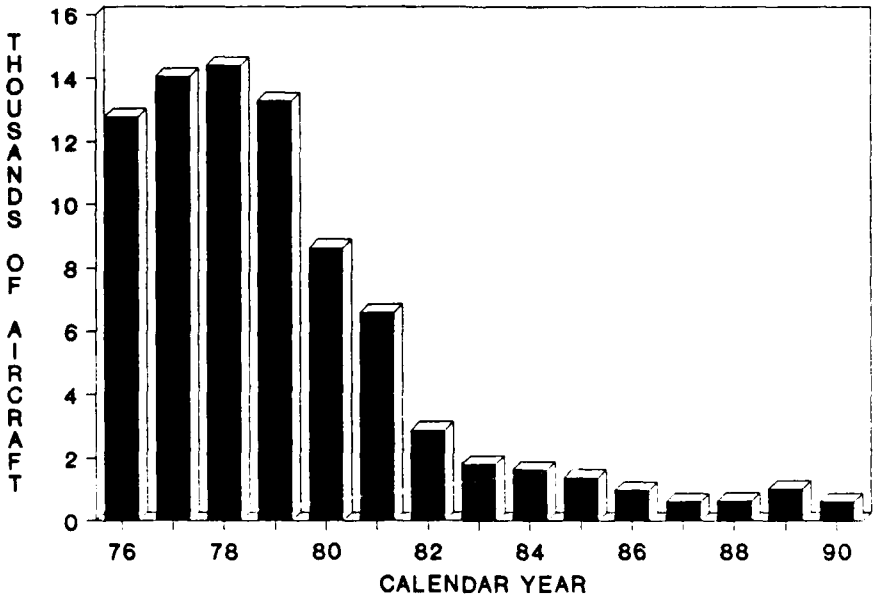
The total cost of owning (maintaining and operating) single-engine piston, multi-engine piston, turboprop, and turbojet has been steadily increasing. As shown on pages 105 to 108 and detailed in Appendix F (page 245), the total nominal cost of owning and operating an aircraft has increased between 74 and 83 percent (4.7 and 5.2 percent annually) since 1978. (This compares to a 101 percent [6.0 percent annually] increase in the consumer price index over the same period.) Last year, however, the increases were somewhat higher, rising between 5 and 8 percent. A single-engine piston aircraft has increased by 82.7 percent since 1978 and by 5.6 percent in 1990; a multi-engine piston aircraft by 73.9 percent since 1978 and by 5.2 percent in 1990; a turboprop aircraft by 75.3 percent since 1978 and by 8.1 percent in 1990; and a turbojet aircraft by 78.5 percent since 1978 and by 8.4 percent in 1990.

Because of the Iraqi invasion of Kuwait, oil prices have increased substantially. (Fuel price changes are one of the costs used in updating the operating cost index.) Jet A prices increased 17.4 percent between June and early December. 100 LL Avgas increased 27.5 percent during the same time period. The 1990 figure in our operating index had Jet A fuel price increasing 9.9 percent and 100 LL Avgas increasing 6.1 percent. With current fluctuations in the price of oil, the eventual impact on general aviation is yet to be determined.

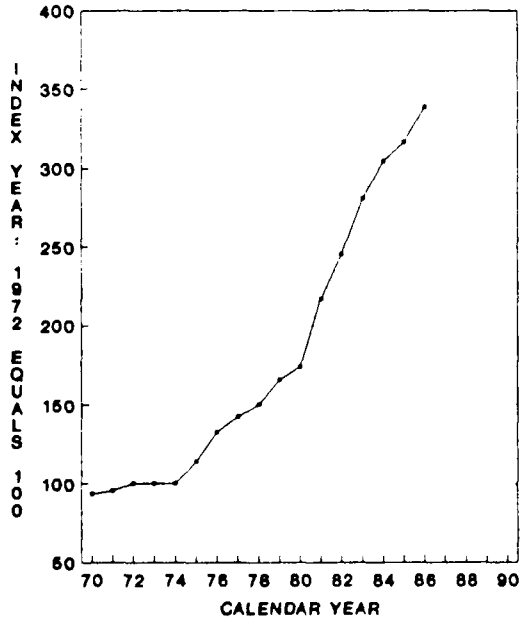
In addition (and as also detailed in Appendix F), the nominal cost of purchasing aircraft has also risen dramatically. Since 1978, the cost of purchasing a single engine piston aircraft has increased by 126 percent (through

SINGLE ENGINE PISTON AIRCRAFT TRENDS

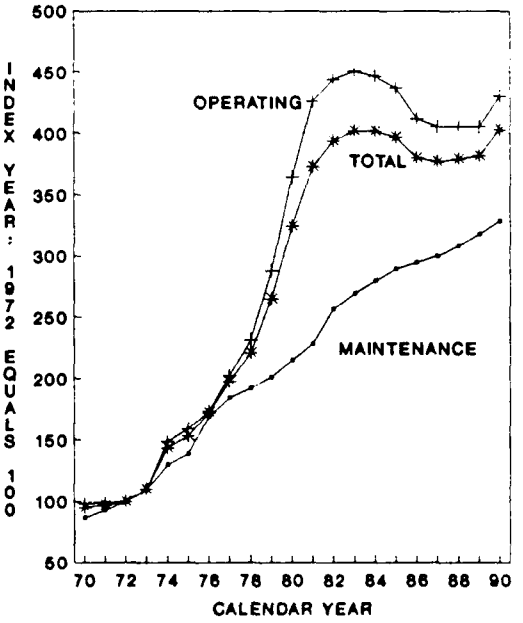
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

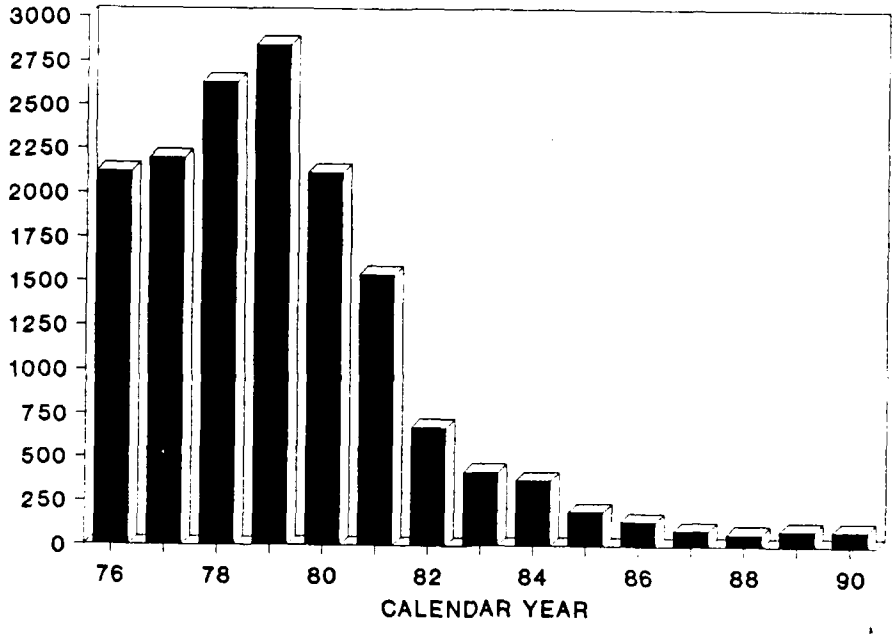


OPERATING AND MAINTENANCE COSTS

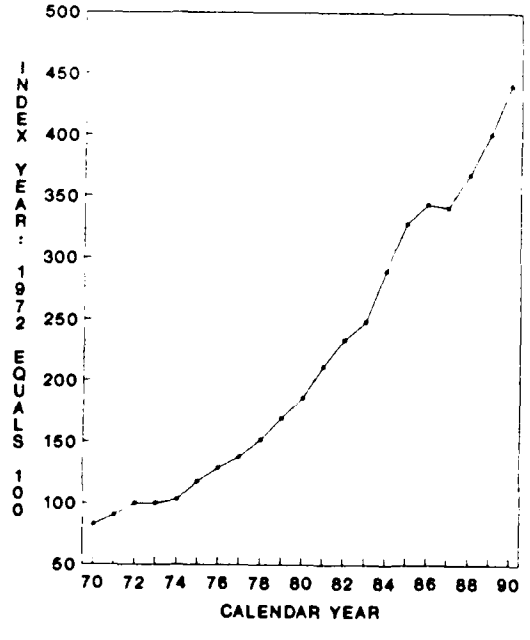


MULTI-ENGINE PISTON AIRCRAFT TRENDS

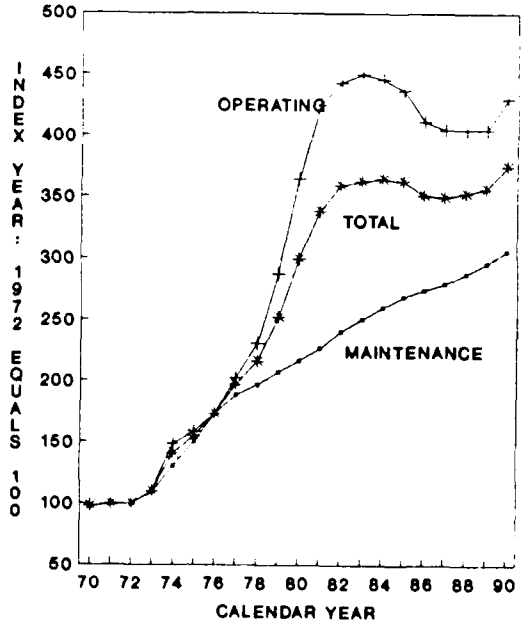
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

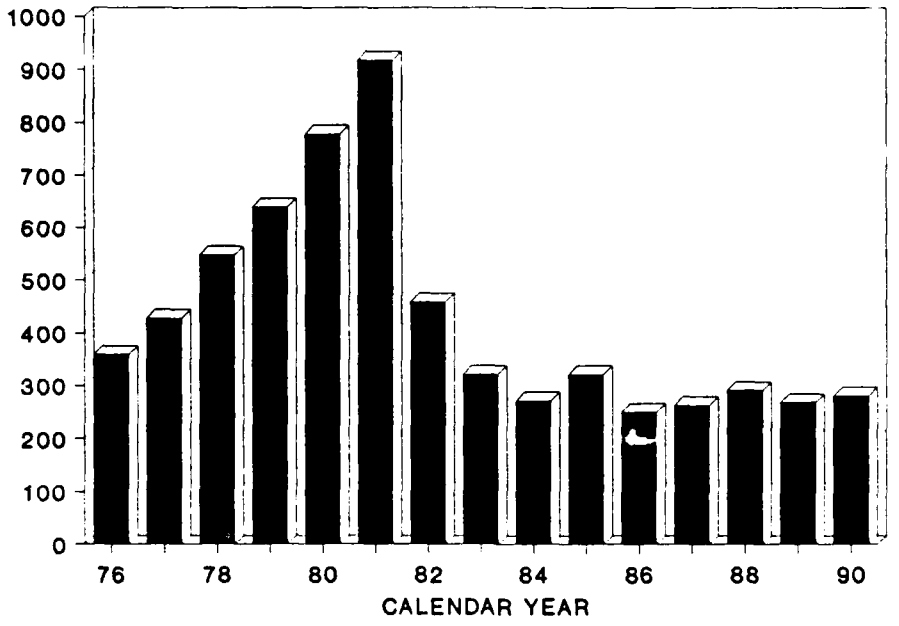


OPERATING AND MAINTENANCE COSTS



TURBOPROP AIRCRAFT TRENDS

AIRCRAFT SHIPMENTS



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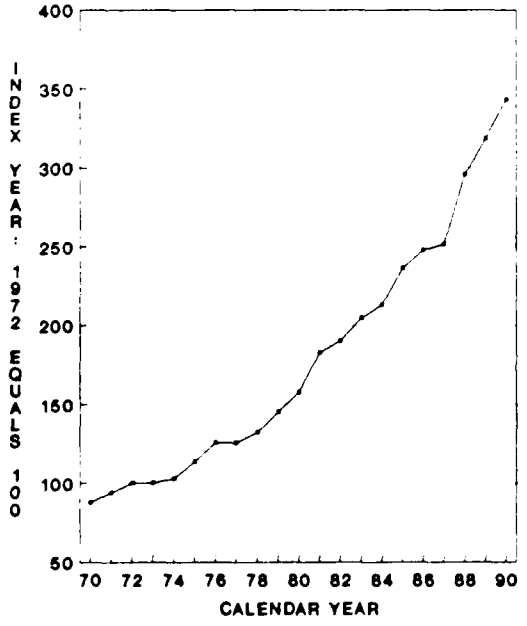
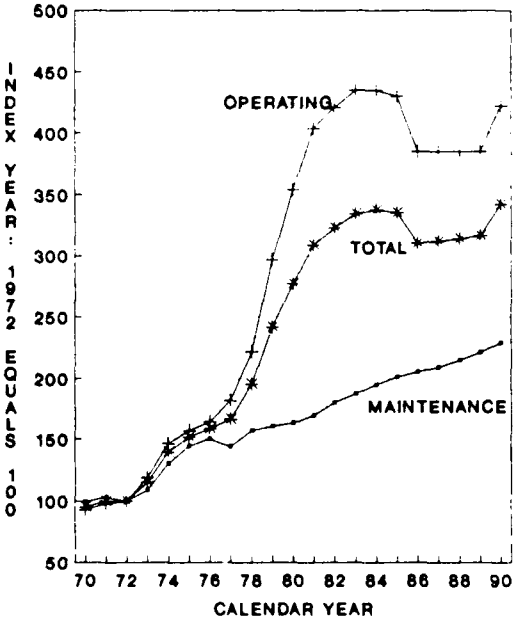
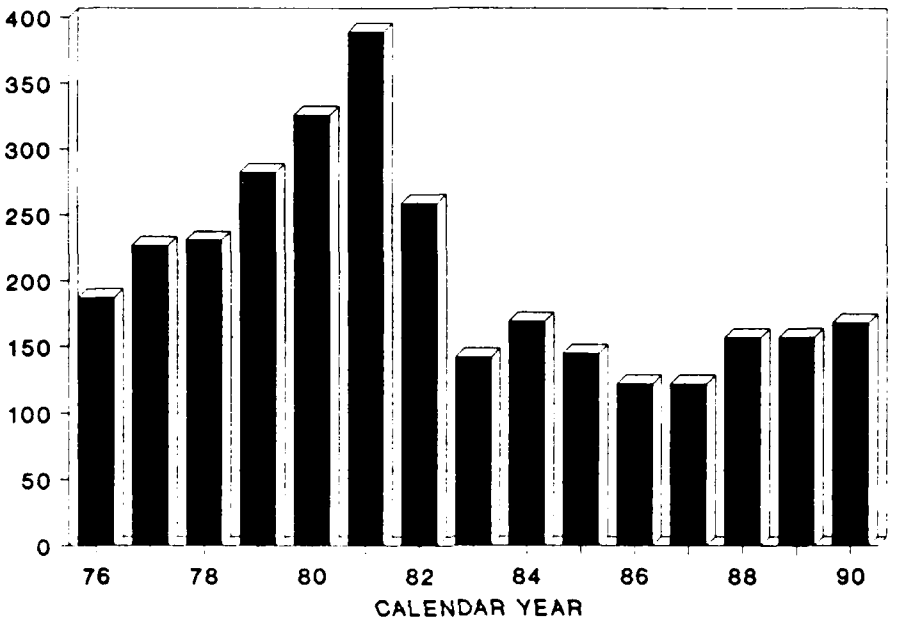


OPERATING AND MAINTENANCE COSTS

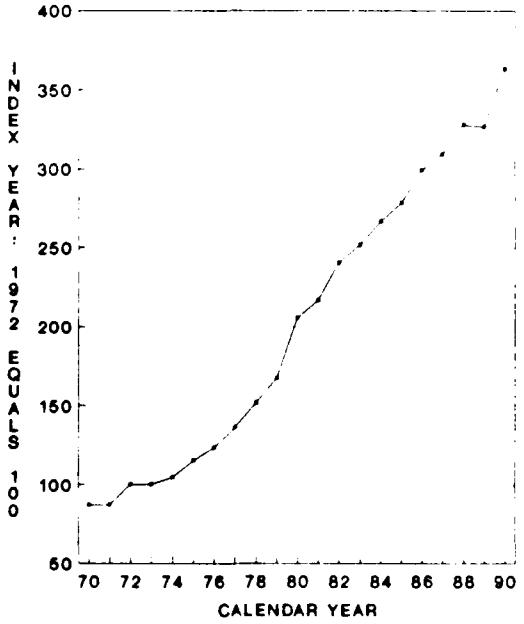


TURBOJET AIRCRAFT TRENDS

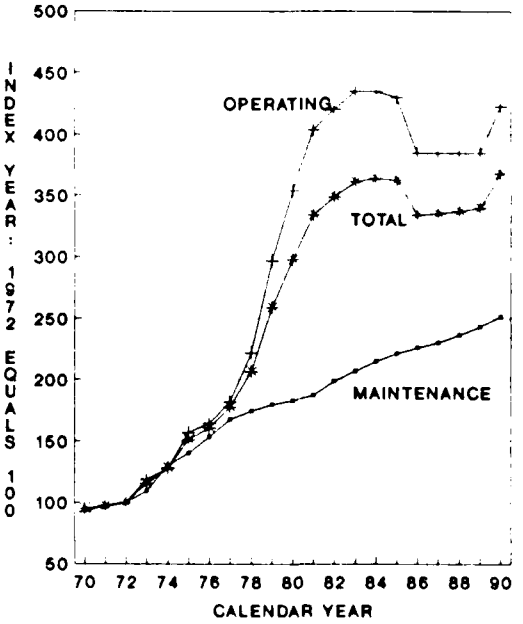
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES



OPERATING AND MAINTENANCE COSTS



1986, the last year for which data are available for this particular aircraft category); the cost of purchasing a multi-engine piston aircraft has risen by 190 percent; the cost of purchasing a turboprop aircraft has risen by 160 percent; and the cost of purchasing a turbojet has risen by 140 percent. Over the last year, the purchase price of multi-engine piston aircraft, turboprop aircraft and turbojet aircraft have increased by 9.8, 7.8, and 11.1 percent, respectively.

Clearly, these increases, both in maintenance and operating costs and in the purchase price, have negatively affected general aviation. However, these economic and cost factors may not explain the total change we are witnessing, especially since the real cost of operating an aircraft has declined since 1978.

DEREGULATION OF THE U.S. COMMERCIAL AIRLINE INDUSTRY

The deregulation of the U.S. commercial airline industry has also affected general aviation. Increased service and better connections by air carriers and regional/commuters has likely reduced the desirability of using private, general aviation aircraft when planning business or pleasure trips. On the other hand, as most real fares have increased (as they have over the last several years) and as air carrier delays and congestion mount, one could expect that the general aviation alternative becomes more attractive.

GENERAL AVIATION FORECASTS

FLEET COMPOSITION

The FAA general aviation forecasts include only active aircraft. As shown in Table 21 and the graphs on page 110, the active general aviation fleet will grow slowly (up 0.4 percent annually) over the 12-year forecasting period, with the increase being driven primarily by greater business use of general aviation.

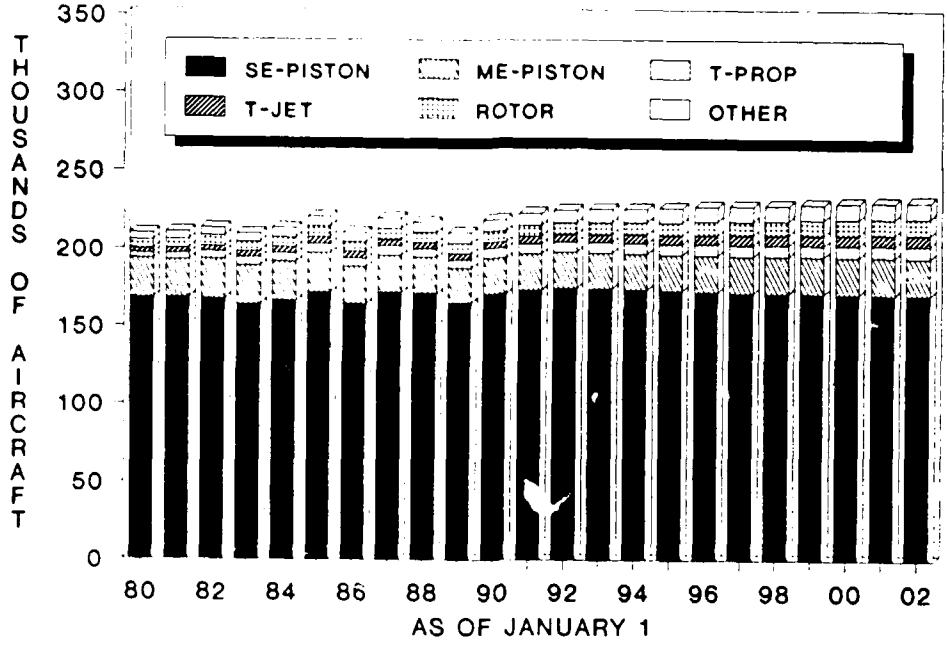
The number of active single engine piston aircraft is projected to remain almost constant over the 12-year forecast period, increasing from 170,370 in 1990 to 170,500 in 2002. There will be some increase between 1990 to 1996 (up 1.2 percent) followed by an annual decline of 0.2 percent over the last six years of the forecast period. The number of multi-engine piston aircraft is expected to increase slightly from 23,400 aircraft to 24,000 thousand in 2002, an average annual increase of 0.2 percent.

Reflecting the increasing sophistication of general aviation flying, turbine-powered aircraft are projected to increase from 10,726 in 1990 to 15,200 in 2002, an annual growth rate of approximately 2.9 percent. The turbine rotorcraft fleet is projected to increase at an annual rate of increase of 6.1 percent over the 12-year period.

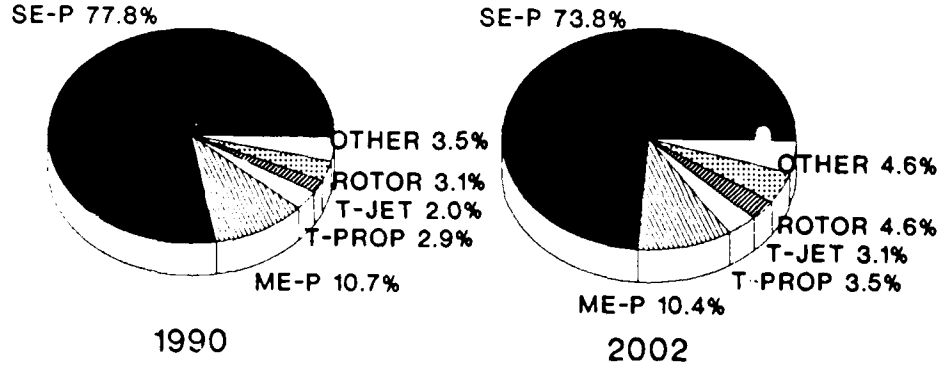
HOURS FLOWN

As shown in Table 23 and the graphs on page 111, growth in general aviation hours flown is expected to average only 1.4 percent annually over the 12-year forecast period, reaching an estimated 41.6 million hours flown in 2002. By contrast, the average annual growth

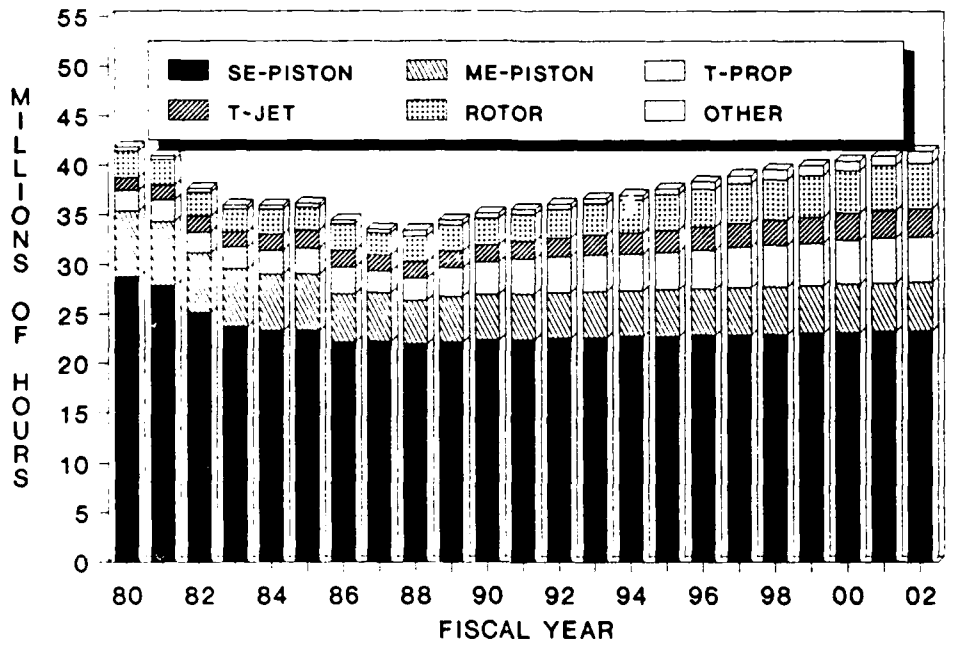
ACTIVE GENERAL AVIATION AIRCRAFT



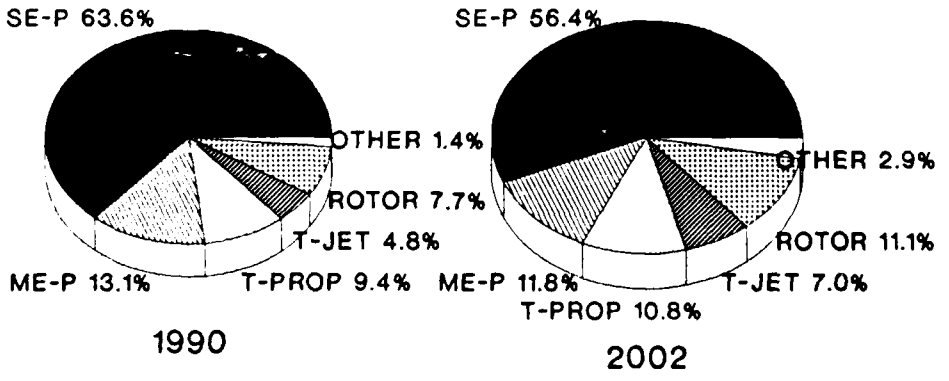
PERCENT BY AIRCRAFT TYPE



GENERAL AVIATION HOURS FLOWN

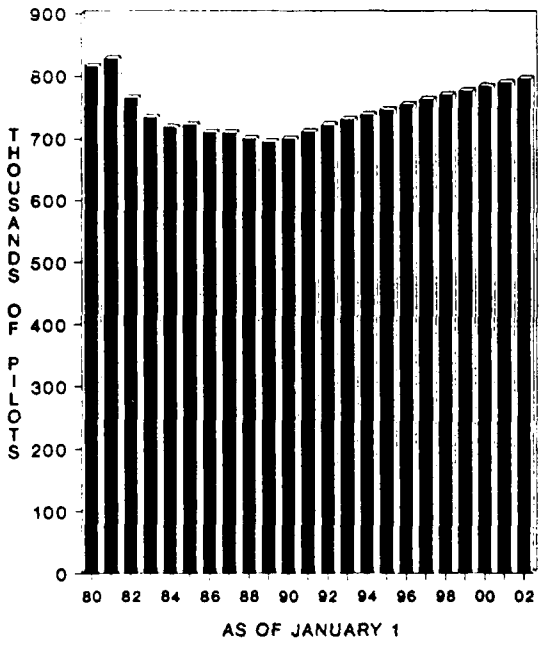


PERCENT BY AIRCRAFT TYPE

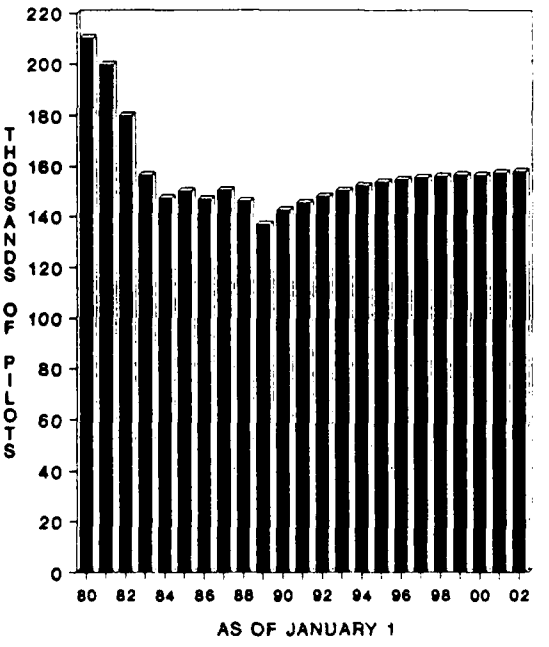


ACTIVE PILOT TRENDS AND FORECASTS

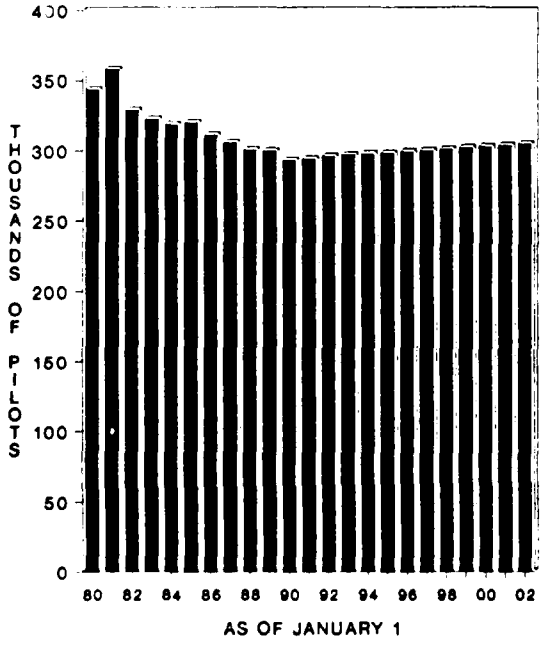
TOTAL PILOTS



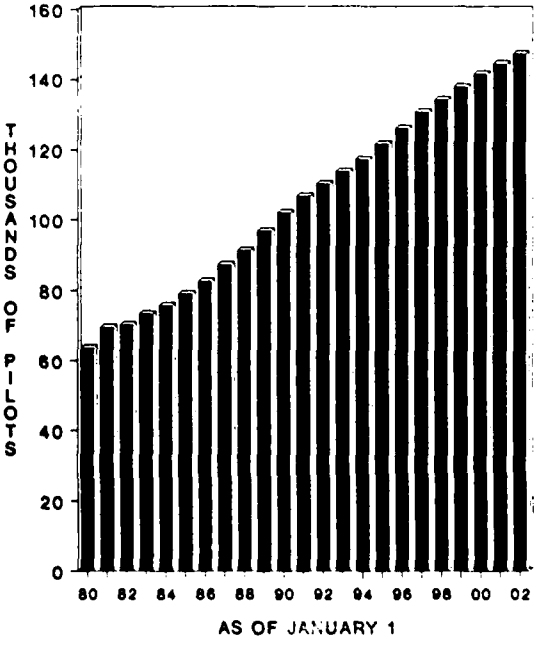
STUDENT PILOTS



PRIVATE PILOTS



AIRLINE TRANSPORT PILOTS

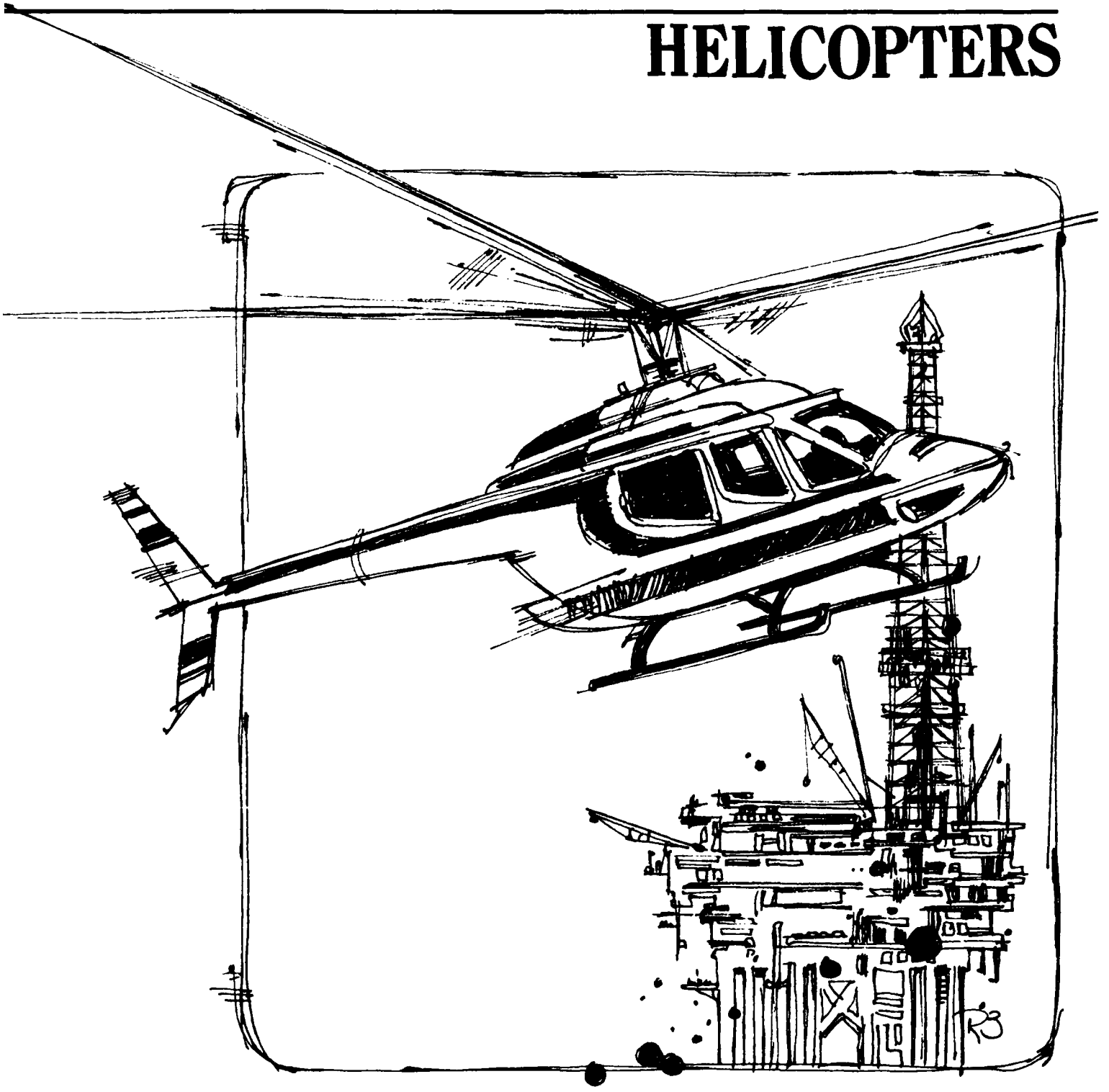


rate in hours flown was about 6.0 percent during the 1960's and 1970's. Single engine piston aircraft hours flown are forecast to increase from 22.4 million hours in 1990 to 23.4 million in 2002, an annual rate of growth of only 0.4 percent. Turbine-powered aircraft hours flown are projected to increase from 4.1 million in 1990 to 6.4 million in 2002, an annual growth rate of 3.3 percent. Turbine rotorcraft hours flown are expected to increase at an annual rate of 5.5 percent over the same time period.

PILOT POPULATION

As shown in Table 24 and the graphs on page 112, the total pilot population is forecast to increase to 795,700 by 2002, a 2.9 percent annual growth rate. Airline transport pilots are projected to reach 147,300 in 2002, a 3.1 percent annual growth rate. This reflects the continuing strong demand for airline transport pilots as the commercial air carriers accommodate increased traffic demands. In contrast, private pilots are only projected to grow 0.3 percent annually over this same period.

CHAPTER VI
HELICOPTERS



CHAPTER VI
HELICOPTERS

REVIEW OF 1990

SHIPMENTS

Preliminary data for calendar year 1990 indicate that shipments of United States civil helicopters will total 570 units that will be valued at $247 million. Compared to 1989, the number of helicopters shipped increased by 10.6 percent but the value of the shipments decreased slightly (down 1.6 percent) due in part to the production of a number of smaller training units and to the relative softness of the economy.

In 1990, the value of complete helicopters exported declined by 10.3 percent to $140 million. Imports remained relatively stable at approximately $110 million. Thus, production for export in the helicopter industry made a net contribution of $30 million in the trade balance. This net contribution was lower than the previous year's $47 million.

The recent increase in the number of units shipped and industry expectations of further increases for 1991 combine with decreases in the value of these shipments to emit mixed signals about the possible economic recovery of the industry.

The technology for a military tiltrotor aircraft has been demonstrated successfully. The aircraft functions as a helicopter on takeoffs and landings, but it is capable of flying at a cruising speed of 300 knots per hour at an altitude of 20,000 to 25,000 feet as a conventional fixed-wing aircraft. While these aircraft may be ordered by the armed forces, budgetary constraints create uncertainties about future program development. However, it is possible that a tiltrotor aircraft may be introduced into the civilian market by the turn of the century.

Use of the tiltrotor aircraft in significant numbers has the potential to enhance the capacity of currently congested airports and airspace such as the Northeast Corridor of the United States. However, to realize that potential may require dedicated routes and special procedures as well as an infrastructure of heliports and vertiports. FAA is investigating various scenarios that may be conducive to the introduction of the tiltrotor aircraft in the civilian market and published in November 1990 a Rotorcraft Master Plan to guide Federal action in this area. (Copies are available through the Systems Requirements Branch at the FAA, phone 202-267-3293.)

The development and deployment of the specialized equipment required by tiltrotor aircraft, coupled with the construction of additional heliports, would stimulate the use of helicopters in the transportation industry. The relatively high operating cost of both tiltrotor aircraft and helicopters

inhibits operations growth. Technological improvements are reducing operating costs; this may foster additional research and, eventually, increase the deployment of vertical lift aircraft for civilian use.

FLEET AND HOURS FLOWN

As of January 1, 1990, there were approximately 7,400 active civil rotorcraft in the United States, about 1,000 more than the 6,400 active helicopters in January 1989. Year-to-year fluctuations in the active rotorcraft fleet are largely the results of national economic conditions and statistical estimating procedures. During recessionary periods, helicopters that are used marginally during economic growth and recovery conditions are relegated to the inactive category. Such shifts are responsible, in part, for the observed variations in the active fleet. In addition, fluctuations in the number and accuracy of responses to the helicopter section of the general aviation survey introduce statistical variations in the estimates of fleet and hours flown.

Active turbine helicopters numbered 4,200 in 1990, approximately 56.8 percent of the active fleet. The proportion of active turbine helicopters decreased slightly in 1990 relative to the 1989 proportion of 59.4 percent. The number of active piston-powered rotorcraft (3,200) increased substantially (23.1 percent) in 1990. The number of active piston-powered helicopters in 1990 was only 3.0 percent lower than the peak of 3,300 observed in 1982.

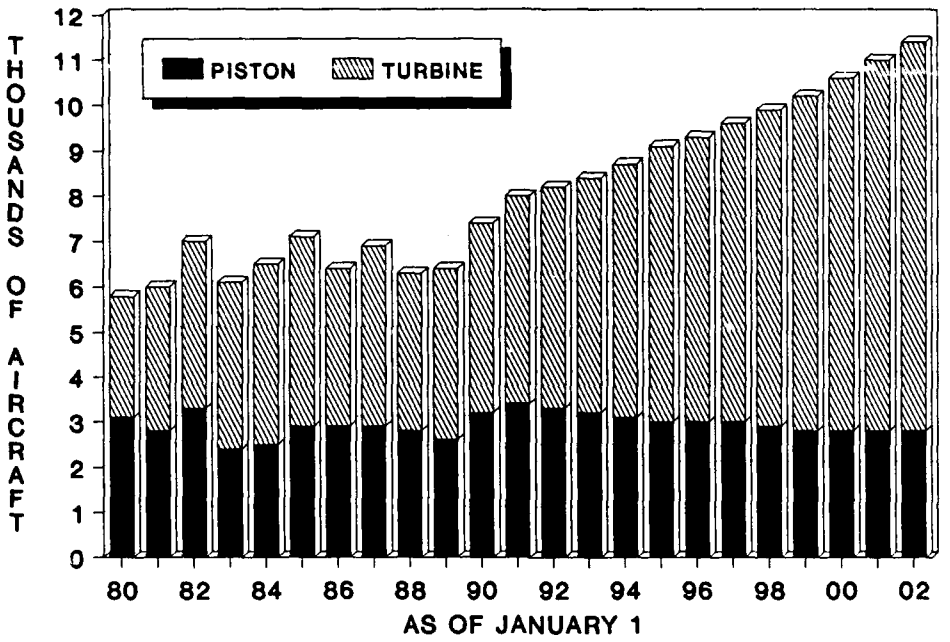
Rotorcraft flew an estimated 2.9 million hours in 1990. Turbine-powered rotorcraft flew 2.1 million hours, 72.4 percent of the total number of hours flown. The number of hours flown by both turbine-powered and piston-powered rotorcraft increased by about 3.6 percent in 1990 relative to the final estimates for 1989.

HELICOPTER FORECASTS

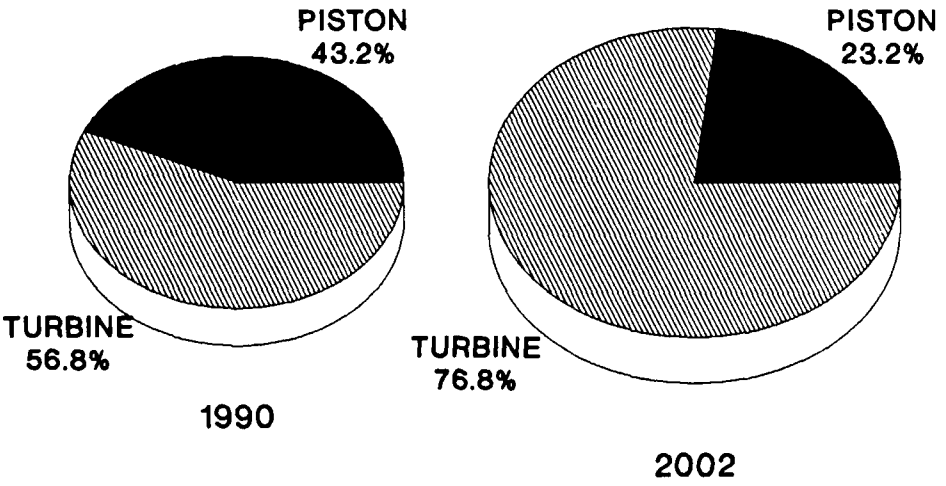
The forecasts of rotorcraft fleet and hours flown presented in this section are derived from the general aviation forecasts and from econometric models and time series analyses undertaken two years ago. The models and analyses were developed by user category (executive, business, personal, etc.). Forecasts of helicopter activity were generated by user category and were added to obtain the national forecasts. The independent variables used in developing the estimates include the cost of owning a helicopter, total employment, and the cost of oil and gas relative to other prices. One of the underlying assumptions is that the cost of fuel would increase. As this occurred, increased petroleum production and exploration would be profitable, leading to increased rotorcraft usage, particularly in off-shore drilling operations. This, together with increased use of helicopters in the general economy, would lead to an increase in the fleet and in hours flown.

This year's forecasts maintain these assumptions and their rationale, by simply updating last year's effort to reflect data for calendar year 1989 and revised economic conditions in the industry. Of course, these forecasts could be affected by the severity and duration of the current economic downturn and by the resolution of the Iraqi conflict.

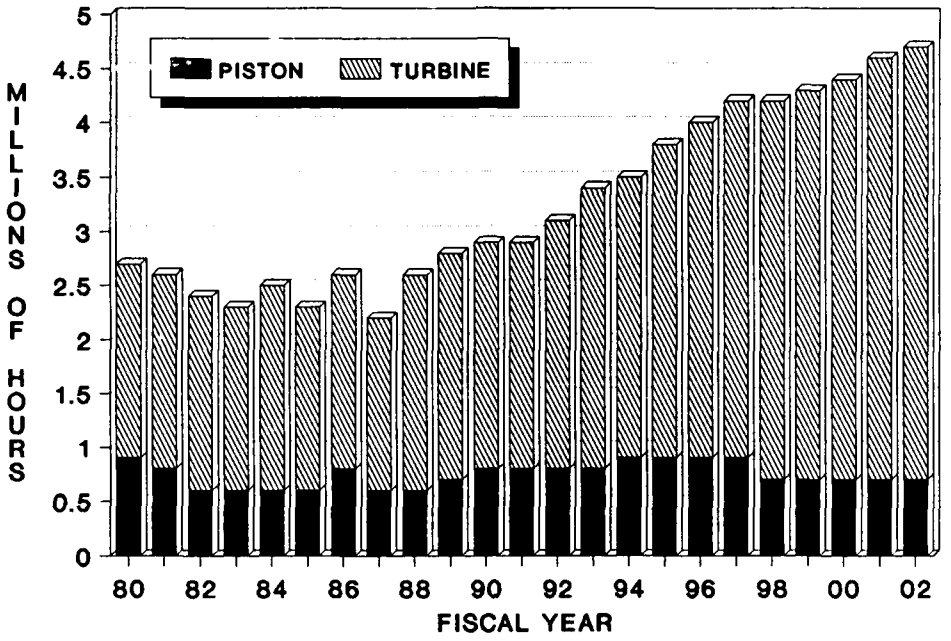
ACTIVE ROTORCRAFT



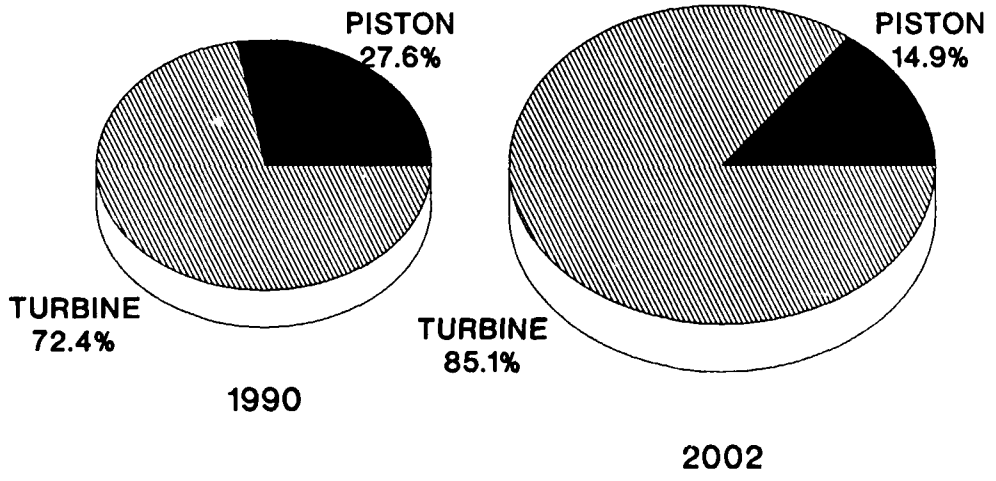
PERCENT BY AIRCRAFT TYPE



ROTORCRAFT HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



FLEET AND HOURS FLOWN

The active rotorcraft fleet is expected to reach 11,200 in the year 2002, an annual average increase of 3.5 percent over the 1990 level. In 2002, the turbine-powered portion of the fleet will number 8,600. This portion of the fleet will increase to 76.8 percent from the 1990 proportion of 56.8 percent. The piston-powered fleet will decrease to 2,600 from its current level of 3,200 helicopters.

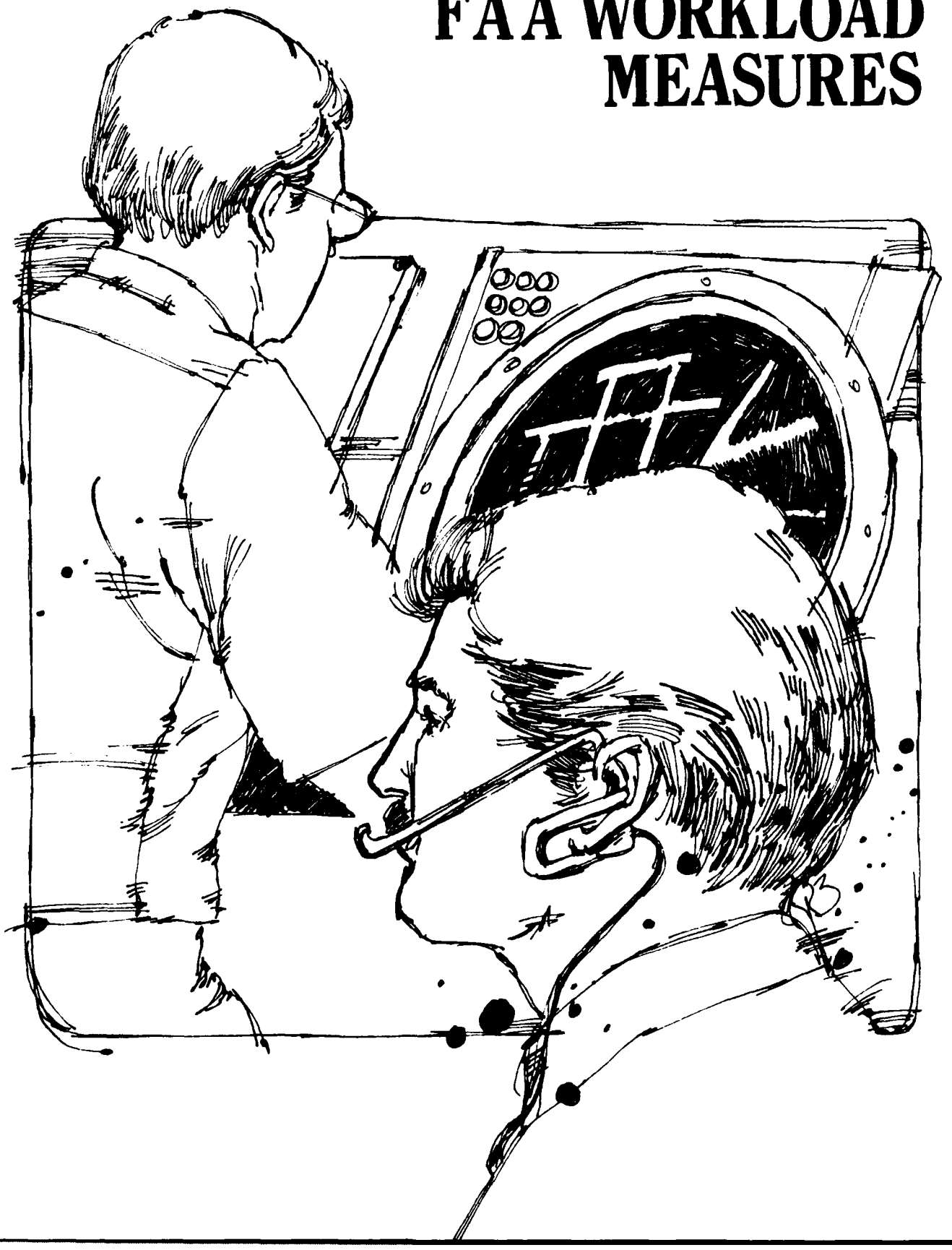
The anticipated growth in the fleet will be accompanied by growth in hours flown which will reach 4.7 million in 2002. This represents an annual average growth of 4.1 percent. Hours flown by turbine-powered helicopters will increase by approximately 90.5 percent and will reach 4.0 million by 2002. In contrast, hours flown by piston-powered rotorcraft will decrease slightly to approximately 700,000 hours during the latter part of the forecast period.

FUEL CONSUMED

In 1990, fuel consumed by rotorcraft totaled 81.6 million gallons. By 2002, fuel consumed will increase to about 145.4 million gallons, an average annual increase of 4.9 percent. More than 94.0 percent of the fuel consumed in 2002 will be used by turbine-powered rotorcraft compared with approximately 88.0 percent in 1990.

CHAPTER VII

FAA WORKLOAD MEASURES



CHAPTER VII

FAA WORKLOAD MEASURES

The FAA provides the aviation community with three distinct operational services: (1) air traffic control service at selected airports, (2) traffic surveillance and aircraft separation by Air Route Traffic Control Centers, and (3) flight planning and pilot briefings at Flight Service Stations. All four aviation system user groups--air carriers, commuters/air taxis, general aviation, and military--utilize these FAA operational services to enhance aviation traffic safety.

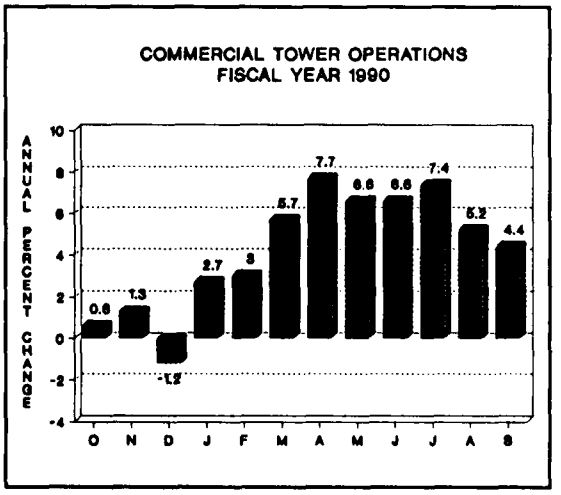
Multiple indicators are used to describe the total FAA operational workload. The four aviation system user groups differ in the demands they impose on the air traffic system. Consequently, no single measure typifies past trends or future demand for the services provided by the FAA. There have been, and will continue to be, different socioeconomic forces driving the growth of each of the aviation-user categories.

REVIEW OF 1990

FAA TOWER ACTIVITY

Aircraft activity at the 404 FAA towered airports totaled 63,542,700 in fiscal year 1990, an increase of 3.6 percent) over the 61,358,000 operations recorded in fiscal year 1989. The increase in 1990 represents the eighth consecutive year of growth, a period during which aircraft activity at FAA towers has increased by 25.5 percent (2.9 percent annually). Despite the strong growth that has occurred since 1982 (50.6 million operations), the level of activity recorded at FAA towered airports in 1990 remains 0.7 percent below the operation counts during the 12-month period immediately preceding the August 1981 air traffic controllers' strike (hereafter referred to as the pre-strike period).

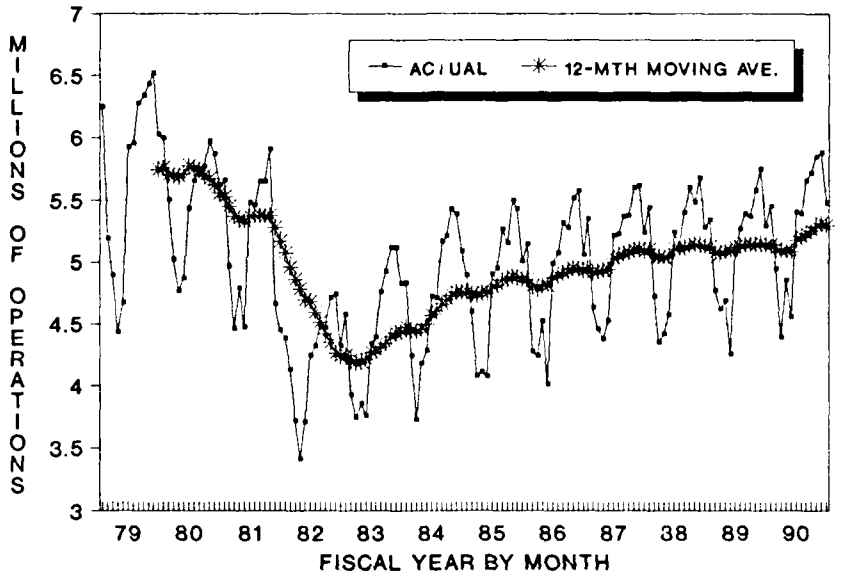
The majority of the growth in activity occurring since 1982 has been the result of strong demand for commercial aviation services. Commercial activity (defined herein as the sum of air carrier and commuter/air taxi operations)



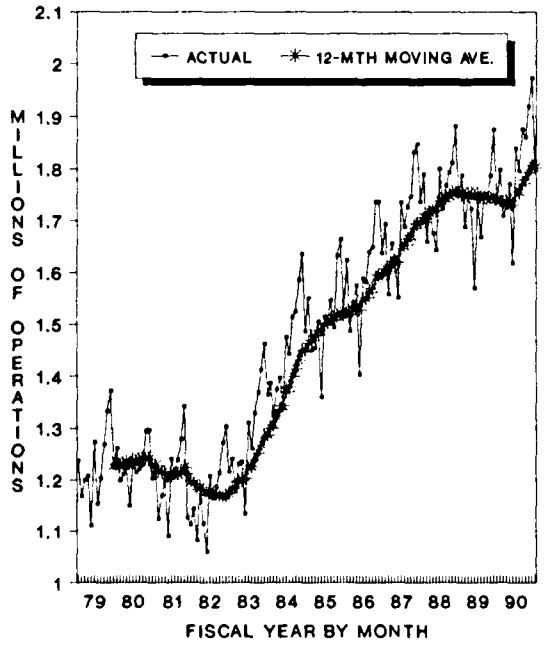
has increased by 53.4 percent since

TOWERED AIRPORT OPERATIONS
ACTUAL AND 12-MONTH MOVING AVERAGE

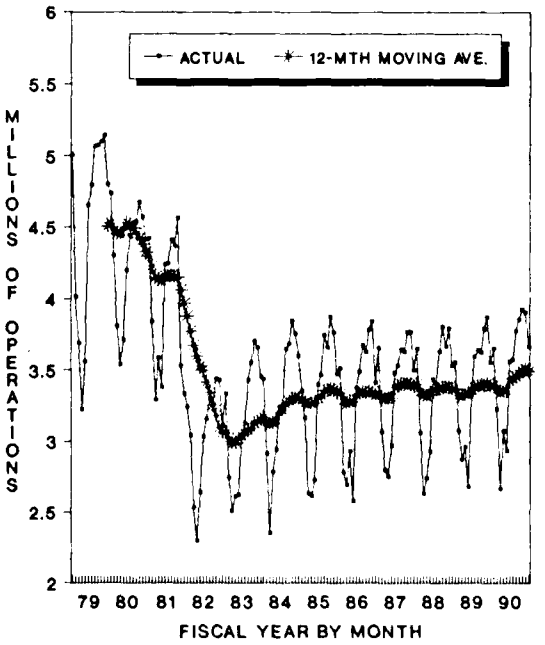
TOTAL OPERATIONS



COMMERCIAL OPERATIONS



NONCOMMERCIAL OPERATIONS



1982, up 4.2 percent in fiscal year 1990. However, part of the growth in 1990 is due to the fact that the Eastern Air Lines' strike (beginning in March 1989) reduced tower counts by approximately 380,000 operations in fiscal year 1989. Noncommercial activity (the sum of general aviation and military operations), on the other hand, has increased by only 14.7 percent between 1982 and 1989, up 3.2 percent in fiscal year 1990.

Air carrier activity at FAA towered airports (12,857,500 operations) increased by 2.7 percent in fiscal year 1990. This increase followed two consecutive years of declining operation counts which saw air carrier activity decline from 13.0 million operations in 1987 to 12.5 million in 1989. The 1989 operations count was, however, distorted by the Eastern Air Lines' strike.

The fastest growing user group continues to be the commuter/air taxi carriers, its activity level increasing to 8,836,000 operations (up 6.5 percent) in fiscal year 1990. Commuter/air taxi activity has increased in every year but one (down 3.3 percent in 1986) since the user category was first designated in 1972. Over the past decade, commuter/air taxi activity at FAA towered airports has grown at an average annual rate of 6.7 percent, from 4.6 million operations in fiscal year 1980 to its current activity level. Much of this growth is the result of commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers. The Eastern Air Lines' strike also affected the operations of its code-sharing partners in 1989, thus reducing the 1989 commuter/air taxi activity counts.

General aviation traffic activity (39,040,900 operations) at FAA towered airports has increased in six of the nine years since the 1981 air traffic controller's strike, increasing by 3.4 percent in fiscal year 1990. However, the 1990 operations count is equal to only 82.9 percent of general aviation's pre-strike level of operations (47.1 million).

The number of local general aviation operations (16,632,100) has increased by 8.0 percent over the past two years, up 6.0 percent in fiscal year 1990 alone. A large part of the growth in local operations is thought to represent an increase in student/pilot training, an favorable omen for future general aviation growth. Itinerant general aviation operations (22,408,700), however, increased only slightly (up 1.4 percent) in fiscal year 1990. Based on fiscal year 1990 operation counts, itinerant operations are at 81.5 percent of pre-strike activity levels (27.5 million), while local operations, are at 86.2 percent of the pre-strike level (19.3 million).

Military operations totaled 2,808,300 in fiscal year 1990, 1.2 percent above 1989 levels. Local military operations (1,371,400) increased by 0.6 percent in 1990 while itinerant military operations (1,436,900) increased by 1.7 percent.

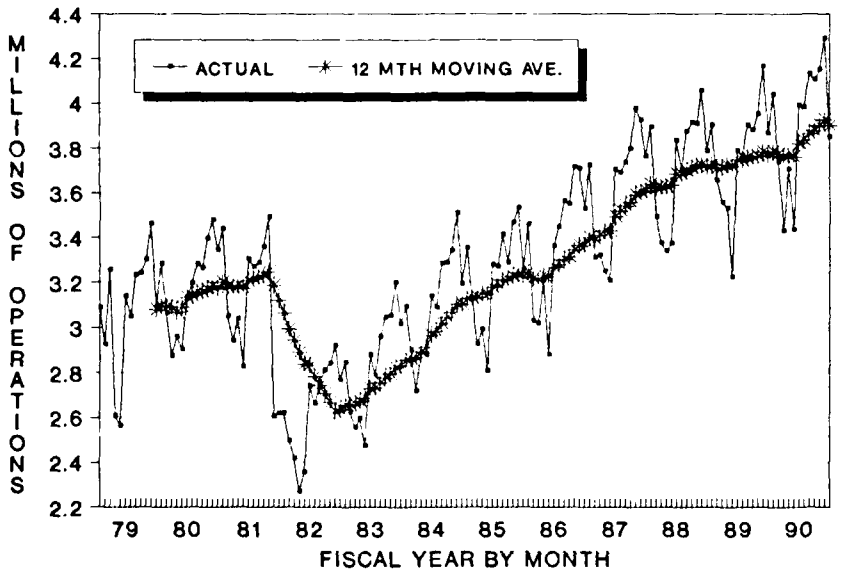
INSTRUMENT OPERATIONS

Instrument operations handled at FAA towers totaled 46,842,700 in fiscal year 1990, 3.6 percent above the 1989 activity level and 20.7 percent above the level of activity recorded in the pre-strike period (38.8 million). A large part of the increase since 1982 can be attributed to the increase in commercial aircraft activity (up 65.2 percent), particularly to commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers.

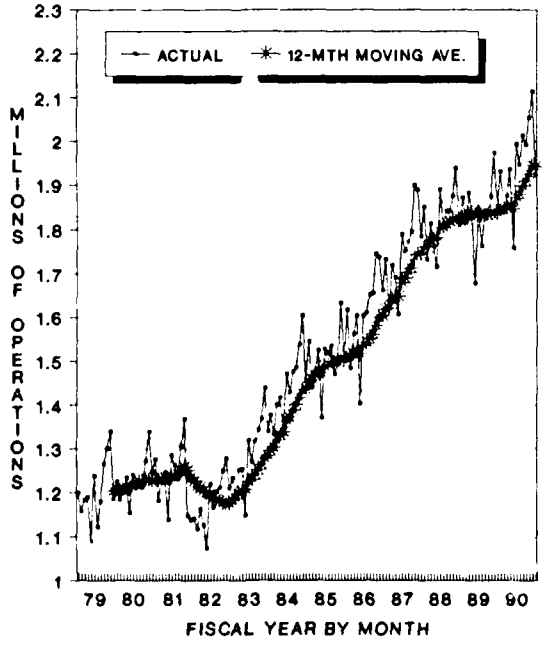
Commercial aircraft activity (23,382,300 operations) increased by 6.0 percent in fiscal year 1990. However, 1989 activity counts were distorted by the Eastern Air Lines'

INSTRUMENT OPERATIONS
ACTUAL AND 12-MONTH MOVING AVERAGE

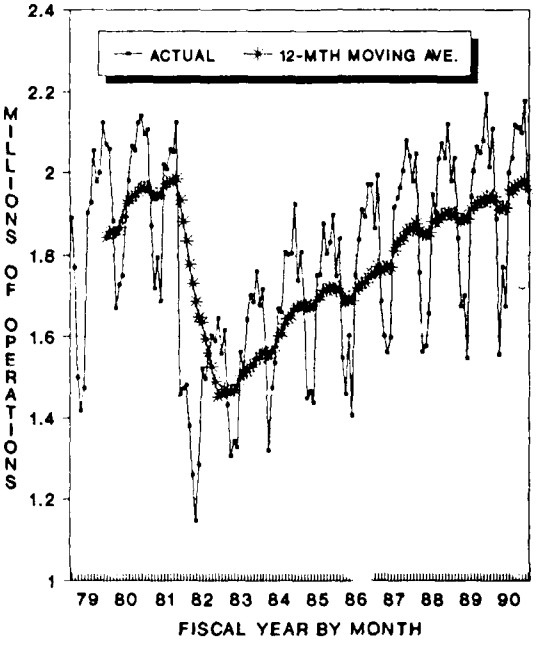
TOTAL OPERATIONS

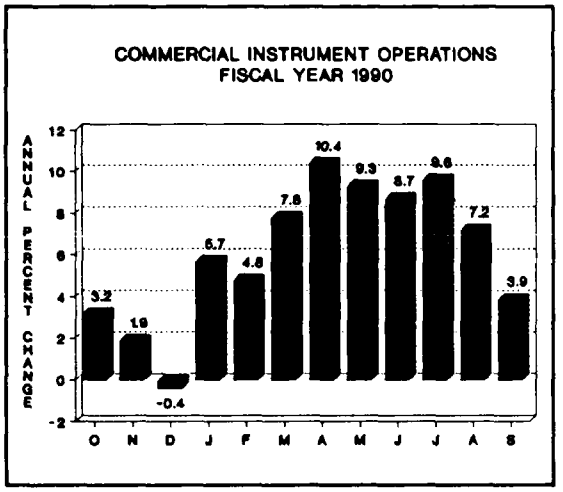


COMMERCIAL OPERATIONS



NONCOMMERCIAL OPERATIONS





strike, thus inflating 1990 activity counts somewhat.

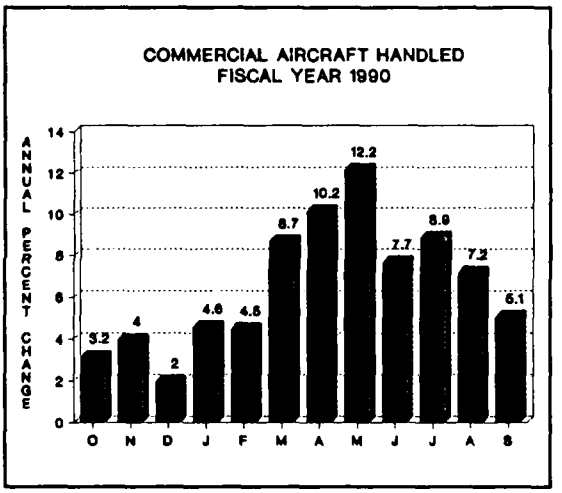
Air carrier instrument operations totaled 14,004,100 (up 3.3 percent) in fiscal year 1990. Commuter/air taxi instrument operations totaled 9,378,200 (up 10.2 percent) over the same time period.

Noncommercial instrument operations (up 34.0 percent since 1982) increased by only 1.4 percent in fiscal year 1990. General aviation activity totaled 19,055,500, up 37.0 percent and 2.1 percent, respectively, over 1982 and 1989 activity levels. Most of the increase in general aviation activity can be attributed to the formation of Airport Radar Service Areas (ARSA's) at 137 locations in the United States. Under the previous Terminal Radar Service Area (TRSA) concept, general aviation aircraft could enter the TRSA without communicating with Air Traffic Control (ATC). Under the ARSA concept all aircraft must be in contact with ATC.

Military instrument operations totaled 4,405,000 in fiscal year 1990, a decline of 1.6 percent from 1989 operation counts.

CENTER ACTIVITY

In fiscal year 1990, the number of aircraft flying under instrument rules handled by FAA Air Traffic Control Centers totaled 37,582,300, an increase of 2.6 percent over 1989. Most of the increase that has occurred at en route centers since 1982 (up 34.9 percent) can be attributed to the growth in commercial aviation activity (up 50.8 percent). The number of commercial aircraft handled at the Centers (24,191,800) increased 6.5 percent in fiscal year 1990. The number of air carrier aircraft handled totaled

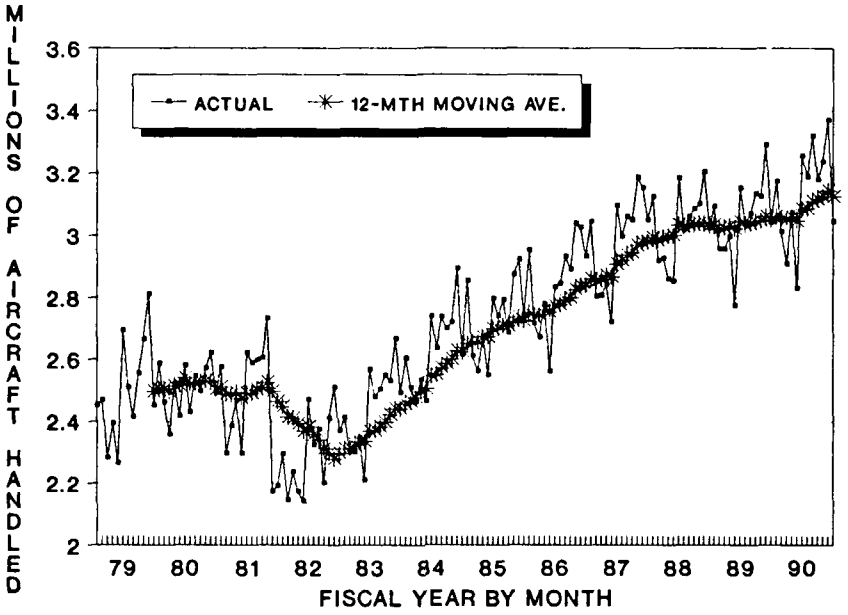


18,557,500 (up 5.9 percent), while the number of commuter/air taxi aircraft handled totaled 5,634,300 (up 8.6 percent). The Eastern Air Lines' strike depressed both air carrier and commuter/air taxi center activity counts for much of fiscal year 1989.

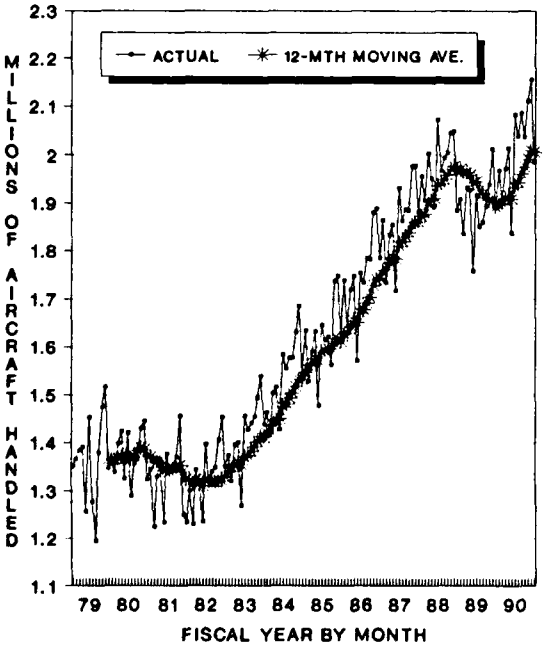
Noncommercial aircraft handled (up 13.3 percent since 1982) declined by 3.7 percent in fiscal year 1990. The number of general aviation aircraft handled totaled 7,930,700, down 3.3 percent over 1989 activity levels. Military activity (5,459,700) also declined in 1990, down 4.3 percent from 1989 activity levels.

IFR AIRCRAFT HANDLED
ACTUAL AND 12-MONTH MOVING AVERAGE

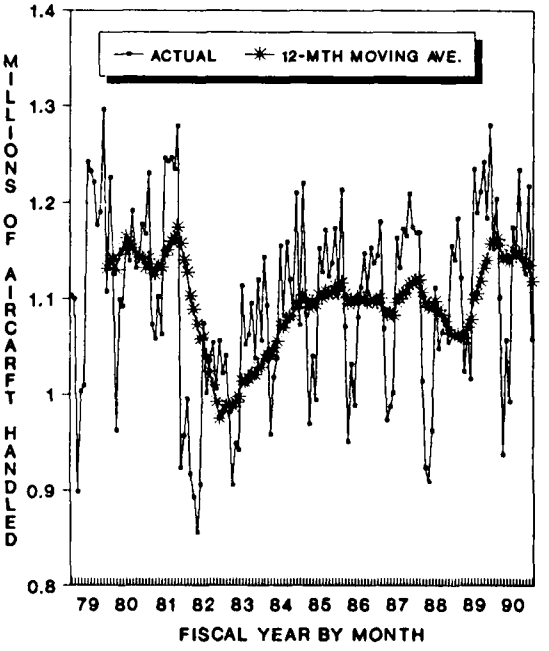
TOTAL AIRCRAFT HANDLED



COMMERCIAL AIRCRAFT HANDLED



NONCOMMERCIAL AIRCRAFT HANDLED



FLIGHT SERVICE STATION ACTIVITY

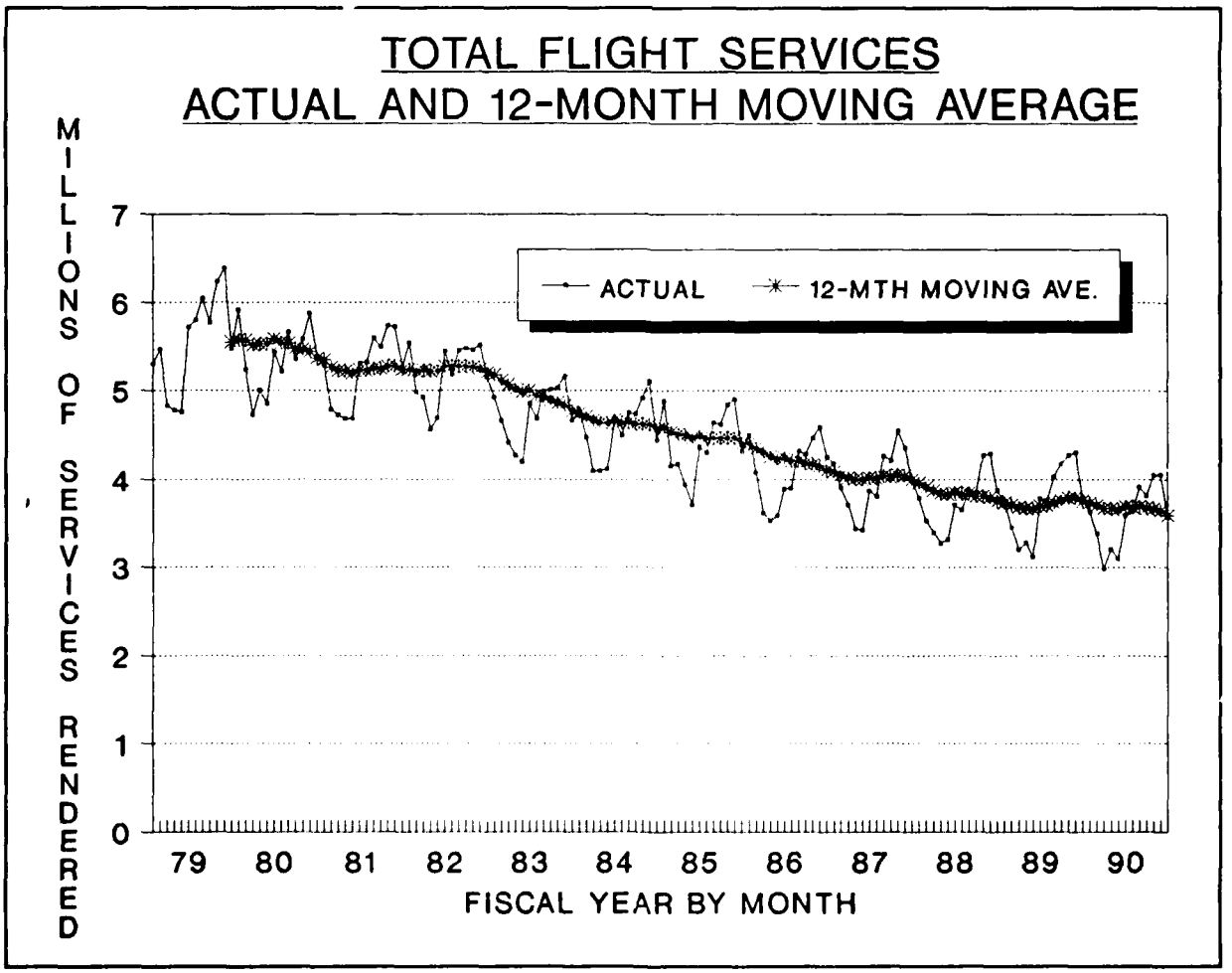
User demand at Flight Service Stations (FSS's)--pilot briefings, flight plans, and aircraft contacted--totaled 42,940,000 in fiscal year 1990, a decline of 4.5 percent from 1989 activity levels. User demand declined in all of the three flight service categories in 1990. The number of aircraft contacted declined 1.8 percent (to 6,049, 800), the number of pilot briefs declined 4.4 percent (to 11,490,400), and the number of flight plans originated declined 5.9 percent (to 6,954,700). (As discussed on page 165, FSS workload data may not fully indicate FSS activity due to consolidation.)

During fiscal year 1990, one Automated Flight Service Station (AFSS) was commissioned, bringing the total to 47. Also in 1990, 27 FSS's were consolidated into the automated FSS's for a total of 180 facilities at the end of the year.

CONTRACT TOWERS

The FAA is currently contracting out "low activity towers", and the operation counts at these locations are no longer included in the FAA tower workload measures. There were 22 contract towers in operation during fiscal year 1990, one more than in operation in 1989.

Operations at contract towers totaled 1,458,500 in fiscal year 1990, an increase of 18.7 percent over the number of operations recorded at contract



towers in 1989. General aviation accounted for the vast majority (85.2 percent) of the activity at these contract towers, up 15.2 percent to 1,243,200 operations. Commuter/air taxi operations totaled 121,600 (up 38.4 percent) while military operations totaled 86,600 (up 55.4 percent). Air carrier operations at contract towers increased by 5.3 percent to 7,400 in fiscal year 1990.

A listing of the current contract towers can be found in Appendix H, beginning on page 255. Operation counts for the 403 FAA towered airports and the 22 contract towers, by user group, can be found in the publication FAA Air Traffic Activity FY 1991, compiled by the FAA's Office of Management Systems (AMS-420).

FORECAST ASSUMPTIONS

Growth in FAA workload measures includes not only the demand imposed on the existing National Airspace System, but also aviation activity at new locations not previously provided FAA services. Aviation activity at contract towers is excluded from the workload measures.

NUMBER OF FAA FACILITIES

Four new FAA towered airports were commissioned during fiscal year 1991; Ft. Pierce, FL (October 1989), Camarillo, CA (April 1990), Ft. Worth Alliance, TX (April 1990); and Tanacross, AK (July 1990). The current forecast assumes that the number of FAA towered airports will remain at the 1990 level (403 airports) throughout the 12-year forecast period.

There are currently 23 Terminal Control Areas (TCA's) and 141 ARSA's. This forecast assumes that there will be 10 additional TCA's and 5 additional ARSA's added to the system over the next two years. This expansion of controlled airspace is reflected in the forecast for instrument operations at airports with FAA traffic control service.

The number of flight service stations and automated flight service stations totaled 180 at the end of fiscal year 1990, 47 AFSS's and 133 FSS's. During the first quarter of fiscal year 1991 eight more FSS's have been closed and consolidated into their respective AFSS's. The current schedule calls for all 61 automated AFSS's to be commissioned by 1993. However, given the recent Congressional directive to implement a system of auxiliary flight service stations in addition to the 61 AFSS's, some of the FSS's currently scheduled to be closed or consolidated may remain open.

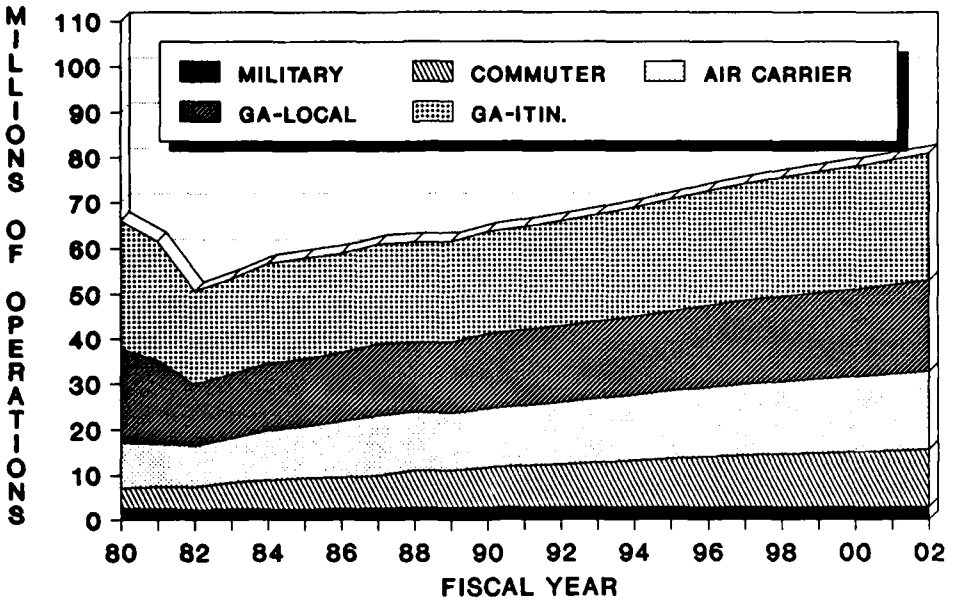
WORKLOAD FORECASTS

FAA TOWER ACTIVITY

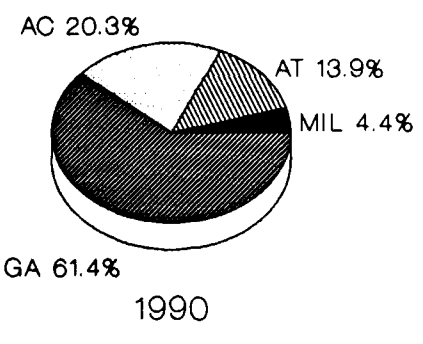
Activity at FAA towered airports is expected to surpass the pre-strike level of 64.0 million in 1991 and will exceed the 1979 peak (69.0 million) in 1995. Operations at FAA towered airports are forecast to increase by only 1.7 percent in 1991.

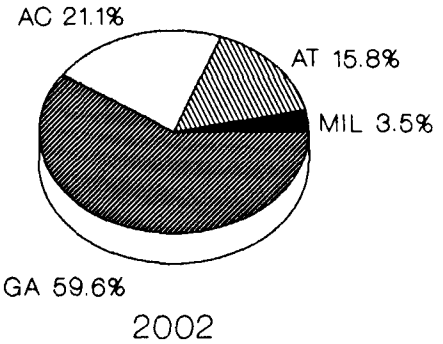
The slow growth in 1991 is, in large part, due to two factors. First, higher jet fuel costs and declining traffic are expected to force U.S. commercial air carriers to reduce aircraft utilization and increase aircraft retirements so as to hold capacity increases to a minimum in 1991. Second, large increases in the price of general

AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP





aviation gasoline is expected to slow the growth in pilot training which, in turn, will result in slower growth in local general aviation operations in 1991.

The cutbacks in air carrier capacity and local GA activity are, however expected to be short lived, with tower activity forecast to grow by 2.0 percent in 1992. Over the 12-year forecast period, operations at FAA towered airports are projected to increase by 2.0 percent annually. In absolute numbers, towered operations are projected to total 80.9 million in 2002.

The mix of aircraft using FAA towered airports is expected to remain fairly stable over the forecast period. This results from the fact that the combined total of general aviation and commuter/air taxi operations (i.e., operations performed by smaller aircraft) is expected to grow at a somewhat slower pace than the number of air carrier operations (27.6 percent compared with 32.6 percent). The combined activities of general aviation and commuters/air taxis are expected to account for 75.4 percent of total tower operations in fiscal year 2002, up only slightly from 75.3 percent in 1990. Air carrier operations' share of towered airport activity is also expected to increase slightly, from 20.3 percent in 1990 to 21.1 percent in fiscal year 2002.

The forecasted average annual growth rate and activity levels for each aviation user group from the year 1990 to the year 2002 is: commuter/air taxi, 3.2 percent (from 8.8 to 12.8 million); air carrier, 2.4 percent (from 12.9 to 17.1 million); and general aviation, 1.8 percent (from 39.0 to 48.2 million). Military operations are expected to remain constant at the 1990 level of activity (2.8 million).

Commercial aircraft activity at FAA towered airports is expected to grow at an average annual rate of 2.7 percent over the 12-year forecast period, from 21.7 to 29.9 million. Noncommercial activity is forecast to increase from 41.8 million in 1990 to 51.0 million in fiscal year 2002, an average annual increase of 1.7 percent.

INSTRUMENT OPERATIONS

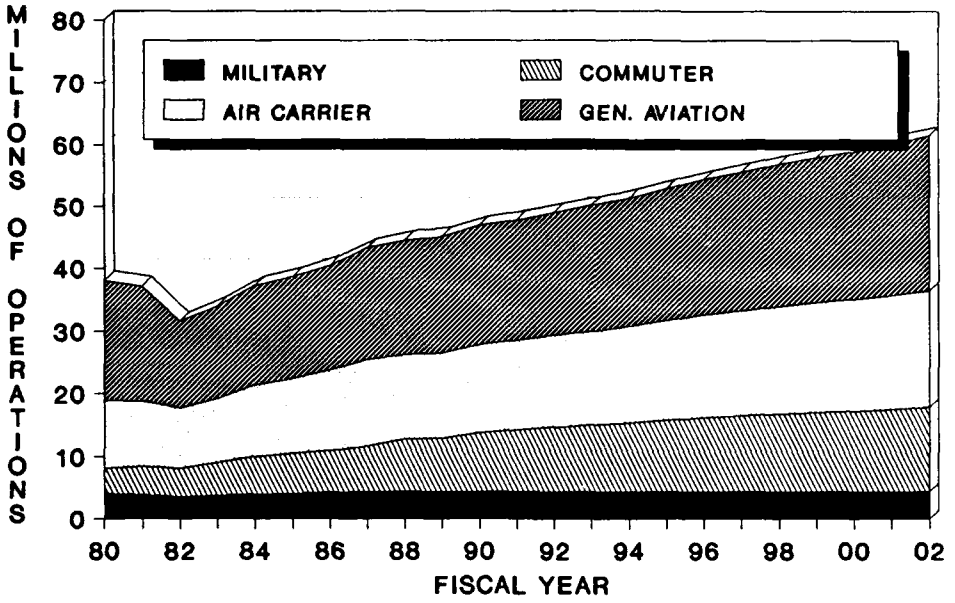
An increase in the number of TCA's and TRSA's in both 1991 and 1992 is expected to result in growth somewhat greater than that forecast at FAA towered airports. Instrument operations are forecast to grow by 2.1 percent in 1991 and by 2.3 percent in 1992. Over the entire 12-year forecast period, instrument operations are expected to increase at an average annual rate of 2.3 percent, growing from a total of 46.8 million operations in 1990 to 61.4 million in fiscal year 2002.

The mix of instrument operations is expected to change over the forecast period. The number of commuter/air taxi and general aviation operations performed by smaller aircraft is expected to increase at a faster rate than the number of operations performed by the larger, more sophisticated air carrier aircraft (34.7 versus 32.9 percent). By fiscal year 2002, 62.5 percent of all instrument operations are expected to be performed by commuter/-air taxi and general aviation aircraft, up from 60.9 percent in 1990.

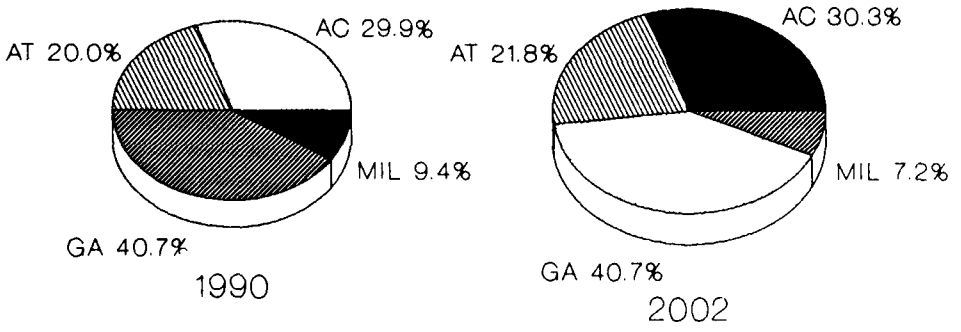
The projected average annual growth rate and activity levels for each user group from the year 1990 to 2002 is: commuter/air taxi, 3.0 percent (from 9.4 to 13.4 million); air carrier, 2.4 percent (from 14.0 to 18.6 million); and general aviation, 2.3 percent (from 19.1 to 25.0 million). Military activity is expected to remain constant at 4.4 million operations throughout the forecast period.

Over the 12-year forecast period, commercial activity is expected to increase at an average rate of 2.6 per-

INSTRUMENT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



cent annually, from 23.4 to 32.0 million. Noncommercial activity is forecast to increase from 23.5 million in 1990 to 29.4 million in fiscal year 2002, an average annual growth rate of 1.9 percent.

CENTER ACTIVITY

The workload at FAA Air Route Traffic Control Centers is expected to exhibit relatively strong growth throughout the forecast period, increasing by 2.4 percent in 1991 and by 2.9 percent in 1992, and averaging 2.2 percent over the 12-year forecast period. In absolute numbers, the center workload is forecast to increase from 37.6 million aircraft handled in 1990 to 48.9 million in fiscal year 2002.

Commercial activities share of center workload is forecast to increase over the 12-year forecast period, from 64.4 percent to 67.9 percent. Between 1990 and the year 2002, air carrier's share is forecast to increase from 49.5 percent to 50.9 percent. Commuter/air taxi's share is expected to increase from 14.9 percent to 17.0 percent over the same time period.

The projected average annual growth rate and activity levels for each user group from 1990 to 2002 is: commuter/air taxi, 3.3 percent (from 5.6 to 8.3 million); air carrier, 2.5 percent (from 18.6 to 24.9 million); and general aviation, 2.2 percent (from 7.9 to 10.2 million). The number of military operations is expected to remain constant at the 1990 level of activity (5.5 million).

Commercial activity is expected to grow at an average annual rate of 2.7 percent over the 12-year forecast period, from 24.2 to 33.2 million. Noncommercial activity is forecast to increase by 1.3 percent annually, from 13.4 million in 1990 to 15.7 million in fiscal year 2002.

Forecasts for individual Centers are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110), phone (212) 267-3355.

FLIGHT SERVICE STATION ACTIVITY

Forecast

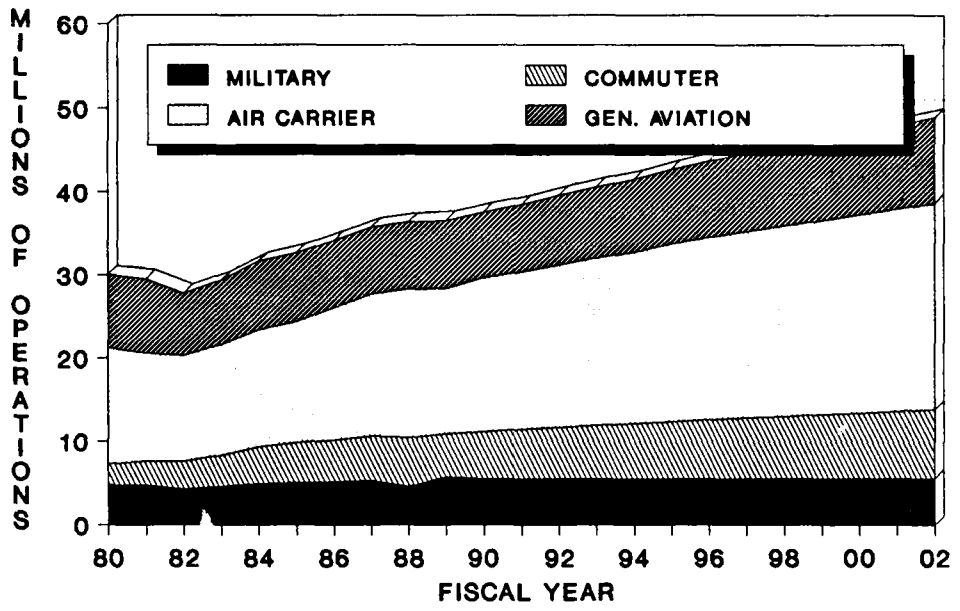
Total flight services originating at FAA Flight Service Stations are projected to decline to 42.3 million (down 1.6 percent) in fiscal year 1991 and then increase to 42.8 million (up 1.2 percent) in 1992. Total flight services are expected to increase at an average annual rate of 0.5 percent over the 12-year forecast period. In actual numbers, flight services rendered are forecast to increase from 43.0 million in 1990 to 45.8 million in fiscal year 2002.

The number of pilot briefings is forecast to decline by 0.9 percent (to million) in 1991, then increase gradually over the remainder of the forecast period. In 2002, pilot briefings are forecast to total 12.0 million, an average annual growth rate of 0.4 percent over the 12-year period.

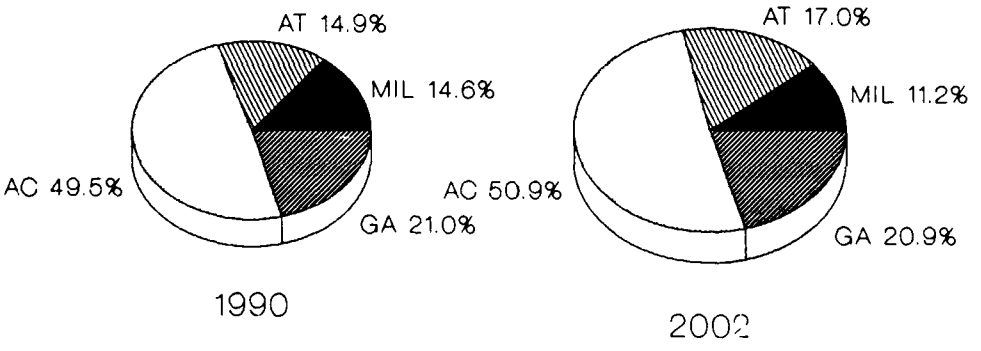
The number of flight plans originated is projected to decline to 6.8 million (down 2.9 percent) in 1991 and then increase by 1.4 percent annually over the remaining 11 years of the forecast period. The number of flight plans originated in 2002 is projected to total 7.9 million.

The number of aircraft contacted is projected to decline to 5.9 million (down 1.7 percent) in 1991 and to 5.8 million (down 1.7 percent) in 1992. Starting in 1994, the number of aircraft contacted is forecast to increase to 6.0 million by the year 1997 and then remain at this level throughout the remainder of the forecast period.

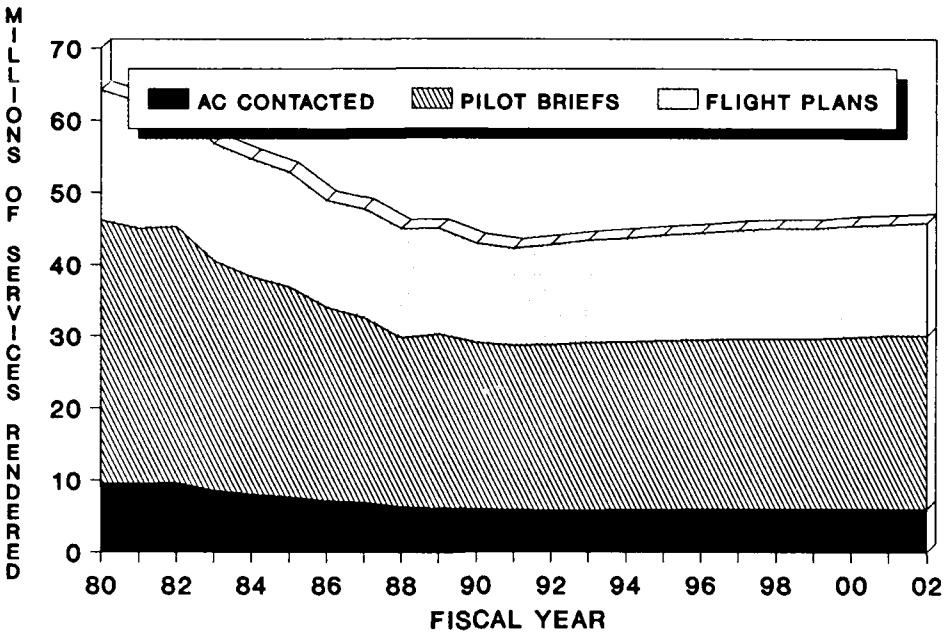
IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



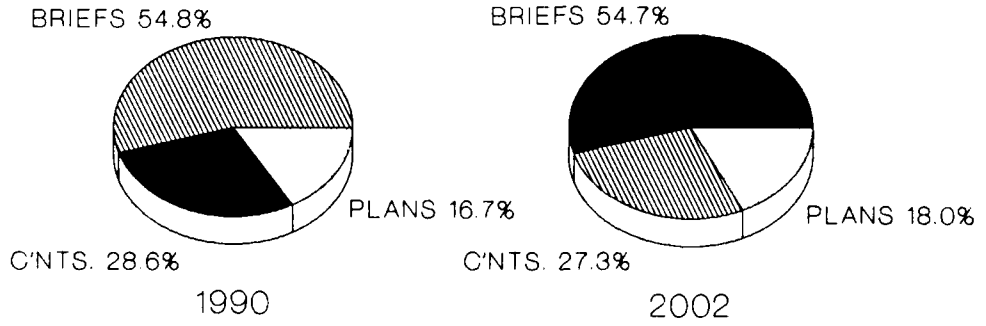
DISTRIBUTION OF WORKLOAD BY USER GROUP



FLIGHT SERVICES ORIGINATED AT FAA FLIGHT SERVICE STATIONS



DISTRIBUTION BY TYPE OF SERVICE RENDERED



Problems With Flight Service Activity Data

The introduction of new technology to flight service applications has significantly changed the operating environment of the flight service system. Viewed in the larger context of the total National Airspace System (NAS), the recent workload trends do not necessarily indicate declining demand for flight planning services. Rather they may indicate that demand is being met through increased use of automation. That is, demands of general aviation are being met through new system capabilities resulting in increased system efficiencies and productivity.

Specifically, several factors resulting from automation will tend to dampen the growth in FSS workload measures, as currently defined. First, pilots can now obtain weather briefings through the Telephone Information Briefing System (TIBS), which does not require contact with a flight service specialist, and is not included in the FSS pilot briefings count. Second, private weather briefing vendors, participating in recently implemented memorandums of agreement, can also file flight plans for their customers without going through an FSS. Third, starting February 1990, the Direct User Access Terminal System (DUATS) became operational. Utilizing DUATS, pilots with access to a computer, modem and telephone can directly access a national weather data base for weather briefingsand flight plan filing without ever going through an FSS.

This automated access may be through the pilots' own computer or through those of field based operators offering the service to their customers. None of the flight planning services provided through the above sources will be included in the FSS workload measures.

Additionally, the process of consolidation will, by definition, continue to reduce the aircraft contact counts at FSS's. As flight service areas expand through consolidation, the number of contacts with multiple facilities during a single flight will be reduced significantly. This decline will continue at least until the FSS system is fully consolidated.

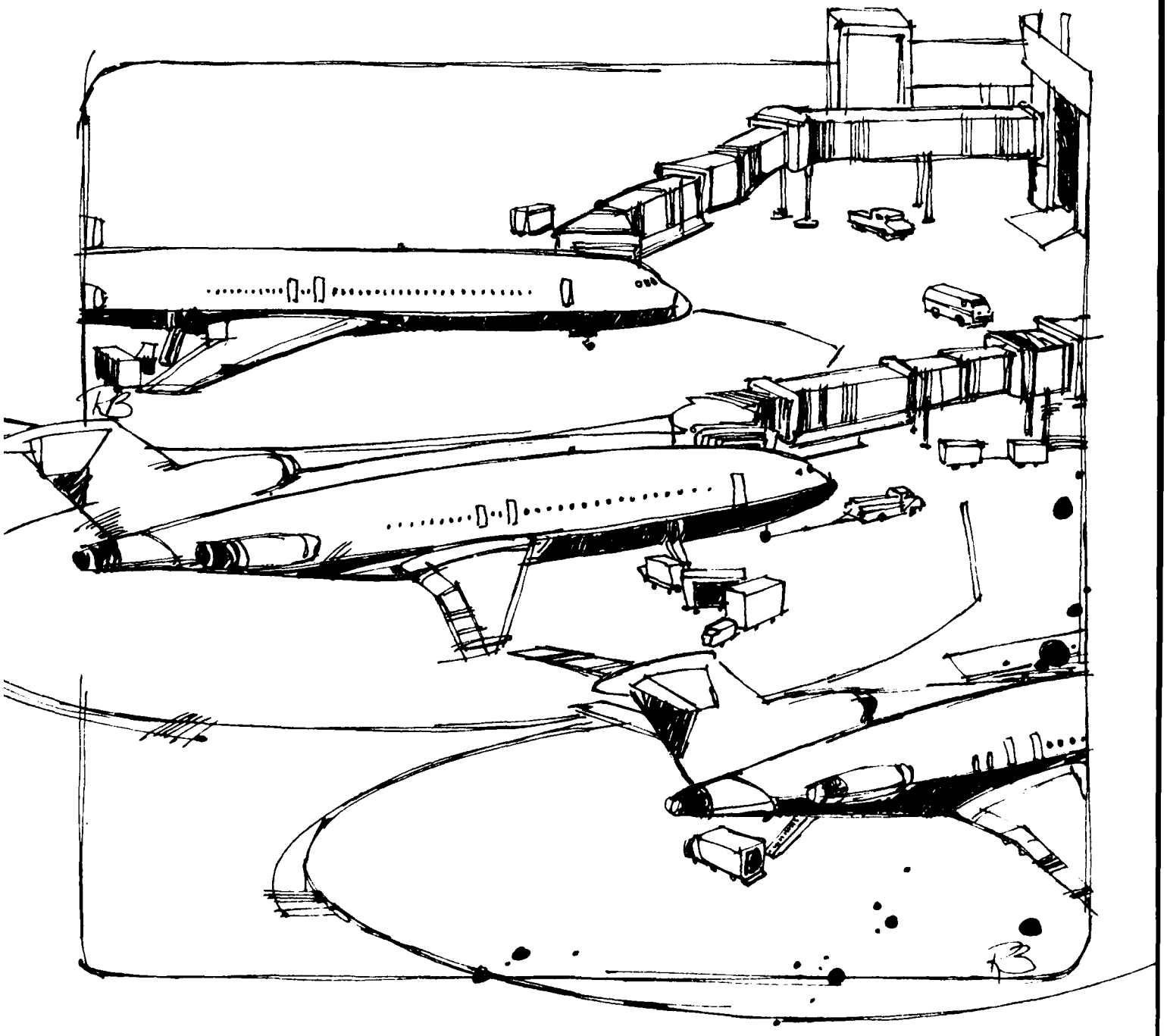
Increasingly, the current FSS workload measures no longer fully reflect the *functions performed* or the level of services provided in an increasingly automated environment. In this regard, the FAA initiated a 12-month effort to develop new staffing standards for the modernized FSS system which is scheduled to be completed by June 1990.

Forecasts for individual Flight Service Stations are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110), phone (202) 267-3355.

CHAPTER VIII

TERMINAL AREA FORECASTS

LARGE HUBS



CHAPTER VIII

TERMINAL AREA FORECASTS
LARGE HUBS

This chapter discusses: (1) the top 50 airports in the United States ranked by total enplanements in fiscal year 1989; (2) the top 50 airports ranked by total operations in 1989; (3) forecasts of total enplanements and total operations at 30 large hub airports; (4) summary data for large, medium, and small hub airports; and (5) selected data by user category for two airports where special studies were conducted for the metropolitan areas in 1990. (For analytical purposes, airport hub size is consistent with the enplanement percentages indicated in the definition for air traffic hubs on page 221 of the Glossary of Terms.)

The preliminary forecasts in this chapter are currently undergoing regional review. The final forecasts will be available in FAA Terminal Area Forecasts FY 1991-2005 during the summer of 1991 from the FAA Office of Aviation Policy and Plans.

REVIEW OF 1989

TOP 50 AIRPORTS

In fiscal year 1989, Chicago O'Hare and Dallas/Fort Worth were the busiest airports in the United States when ranked by total enplanements (air carrier, commuter, and air taxi) and total aircraft operations (see tables on pages 144 to 147). Chicago O'Hare had 28.4 million passenger enplanements and 789,400 aircraft operations. Dallas/Fort Worth had 23.8 million enplanements and 693,600 operations. Thus, Chicago and Dallas/Fort Worth ranked first and second, respectively, in both total enplanements and total operations. In 1988, Atlanta was ranked ahead of Dallas/Fort Worth in both total enplanements and total operations.

Other airports among the top five ranked by total enplanements in 1989 were Los Angeles International Airport, Atlanta, and New York Kennedy. In 1988, these airports were ranked fourth, second, and sixth, respectively, in total enplanements. By comparison, when ranked by total operations in 1988, these airports were fourth, second, and 30th, respectively.

International travel through John F. Kennedy International Airport has recovered considerably from the decrease observed in previous years. Consequently, Kennedy rose from eighth in total enplanements in 1986 to fifth in 1989. Prior to 1985, Van Nuys, a general aviation only airport, was consistently among the top five in total aircraft operations. In subsequent years, operations at the airport de-

TOP 50 AIRPORTS
BY TOTAL ENPLANEMENTS IN 1989
(IN THOUSANDS)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-88 Rank
1. Chicago O'Hare	28,386	5.86	5.86	1
2. Dallas/Ft. Worth	23,820	4.93	10.79	3
3. Los Angeles Int'l	22,752	4.71	15.50	4
4. Atlanta	21,652	4.48	19.98	2
5. New York Kennedy	14,874	3.08	23.06	6
6. San Francisco Int'l	14,782	3.06	26.12	7
7. Denver	13,732	2.84	28.96	5
8. Miami	11,454	2.37	31.33	8
9. New York LaGuardia	11,195	2.32	33.65	10
10. Boston	11,088	2.30	35.95	9
11. Newark	10,455	2.16	38.11	11
12. Phoenix	10,269	2.13	40.24	15
13. Detroit	10,212	2.11	42.35	13
14. Honolulu	10,202	2.11	44.46	14
15. St. Louis Int'l	9,941	2.06	46.52	12
16. Minneapolis/St. Paul	9,149	1.89	48.41	17
17. Pittsburgh	8,581	1.78	50.19	16
18. Orlando	8,391	1.74	51.93	18
19. Las Vegas	7,799	1.61	53.54	21
20 Seattle-Tacoma	7,580	1.57	55.11	23
21. Charlotte	7,546	1.56	56.67	24
22. Houston Intercont'l	7,496	1.55	58.22	22
23. Washington National	7,269	1.50	59.72	19
24. Philadelphia	7,241	1.50	61.22	20
25. Salt Lake City	5,517	1.14	62.36	26
26. San Diego	5,467	1.13	63.49	25
27. Baltimore	5,098	1.06	64.55	28
28. Washington Dulles Int'l	4,879	1.01	65.56	31
29. Kansas City	4,598	.95	66.51	29
30. Tampa	4,586	.95	67.46	30

(Continued on next page)

TOP 50 AIRPORTS
BY TOTAL ENPLANEMENTS IN 1989
(IN THOUSANDS)
(continued)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-88 Rank
31. Cincinnati	4,431	.92	68.38	33
32. Raleigh/Durham Int'l	4,315	.89	69.27	37
33. Fort Lauderdale	4,309	.89	70.16	32
34. Memphis	4,270	.88	71.04	27
35. Cleveland	3,993	.83	71.87	34
36. San Juan	3,991	.83	72.70	36
37. Nashville	3,965	.82	73.52	38
38. Houston Hobby	3,931	.81	74.33	35
39. Chicago Midway	3,562	.74	75.07	40
40. New Orleans	3,240	.67	75.74	39
41. San Jose	3,217	.67	76.41	42
42. Portland	3,200	.66	77.07	41
43. Dallas Love Field	2,781	.58	77.65	46
44. Indianapolis	2,671	.55	78.20	43
45. Ontario	2,623	.54	78.74	49
46. San Antonio	2,593	.54	79.28	44
47. West Palm Beach	2,526	.52	79.80	45
48. Albuquerque	2,448	.51	80.31	50
49. Hartford	2,422	.50	80.81	47
50 Dayton	2,304	.48	81.39	48

Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.

* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuters, and air taxis.

** Based on 483.094 million passenger enplanements.

TOP 50 AIRPORTS
BY TOTAL OPERATIONS IN 1989
(IN THOUSANDS)

Airport	Total Operations*	Percent**	Cumulative Percent	FY-88 Rank
1. Chicago O'Hare	789.4	1.29	1.29	1
2. Dallas/Ft. Worth	693.6	1.13	2.42	3
3. Atlanta	669.5	1.09	3.51	2
4. Los Angeles Int'l	632.2	1.03	4.54	4
5. Santa Ana/Orange County	533.5	.87	5.41	5
6. Van Nuys	499.1	.81	6.22	7
7. Fort Worth Meacham	492.7	.80	7.02	6
8. Phoenix	479.8	.78	7.80	10
9. Denver	468.5	.76	8.56	9
10. Long Beach	462.2	.75	9.31	8
11. San Francisco Int'l	434.3	.71	10.02	12
12. St. Louis Int'l	425.3	.69	10.71	11
13. Charlotte Douglas	424.0	.69	11.40	15
14. Boston	417.1	.68	12.08	14
15. Honolulu	406.1	.66	12.74	13
16. Seattle Boeing Field	404.6	.66	13.40	17
17. Oakland Int'l	403.2	.66	14.06	16
18. Pontiac	401.8	.65	14.71	19
19. Philadelphia	383.3	.62	15.33	23
20 Pittsburgh	378.5	.62	15.95	22
21. Miami	378.3	.62	16.57	24
22. Las Vegas	378.1	.62	17.19	18
23. Newark	376.8	.61	17.80	20
24. Minneapolis/St. Paul	376.2	.61	18.41	21
25. Detroit Metro	368.9	.60	19.01	27
26. Denver Centennial	367.7	.60	19.61	26
27. New York LaGuardia	355.6	.58	20.19	25
28. Miami Tamiami	354.1	.58	20.77	29
29. New York Kennedy	336.7	.55	21.32	30
30. Memphis	334.5	.55	21.87	31

(Continued on next page)

TOP 50 AIRPORTS
BY TOTAL OPERATIONS IN 1989
(IN THOUSANDS)
(continued)

Airport	Total Operations	Percent*	Cumulative Percent	FY-88 Rank
31. Seattle Takoma Int'l	327.8	.53	22.40	33
32. San Jose Int'l	317.8	.52	22.92	36
33. Washington National	316.1	.52	23.44	28
34. Chicago Midway	316.0	.52	23.96	37
35. Baltimore	306.7	.50	24.46	32
36. Houston Intercont'l	294.0	.48	24.94	35
37. Salt Lake City	293.1	.48	25.42	38
38. Orlando	285.6	.47	25.89	34
39. Grand Forks Int'l	284.8	.46	26.35	40
40. Nashville	275.7	.45	26.80	39
41. Raleigh Durham	272.5	.44	27.24	42
42. Tulsa Riverside	268.1	.44	27.68	41
43. Portland Int'l	267.8	.44	28.12	46
44. Daytona Beach	265.0	.43	28.55	43
45. Vero Beach	264.8	.43	28.98	49
46. Cincinnati	264.7	.43	29.41	45
47. Concord	263.0	.43	29.84	44
48. Melbourne	261.8	.43	30.27	50
49. Houston Hobby	257.3	.42	30.69	47
50 Cleveland Hopkins Int'l	256.5	.42	31.11	48

Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.

* Based on 61.345 million operations at 400 FAA-operated airport traffic control towers.

clined and Van Nuys' rank dropped to eighth in 1988 when it was surpassed by Santa Ana, Denver, and San Francisco. In 1989, Van Nuys rebounded to sixth place with an 8.6 percent increase in total aircraft operations.

In fiscal year 1989, the top 50 commercial airports accounted for 81.4 percent of the total number of enplanements which occurred at airports with 1,000 or more enplanements. In fact, the top five airports (Chicago, Dallas/Fort Worth, Los Angeles, Atlanta, and Kennedy) accounted for 23.1 percent of total passenger enplanements. The top 20 airports had 55.1 percent of total enplanements. These percentages are slightly lower than those reached in 1988.

LARGE/MEDIUM/SMALL HUB AIRPORTS

In fiscal year 1989, there were 30 large hub airports, 41 medium hub airports, and 64 small hub airports. The large hub airports accounted for 326.0 million enplanements, 67.5 percent of the approximately 483.1 million passengers enplaned nationally. The medium hub airports enplaned 101.4 million passengers and the small hubs enplaned 34.6 million, 21.0 percent and 7.2 percent of the total, respectively. Based on total passengers, the large hub airports decreased by 1.1 percent. The medium hub airports grew by 3.2 percent and the small hub airports grew by 0.8 percent.

Aircraft operations at the large hub airports totaled 11.9 million in 1989, about 1.3 percent below the 1988 level. At the medium and small hub airports, there were 9.0 and 8.6 million operations, respectively. The 1989 operations at the medium and small hub airports were virtually unchanged from the 1988 levels.

LARGE HUB FORECASTS

Using fiscal year 1989 as the base year, forecasts for airports in the Terminal Area Forecasts (TAF) were generated for each year to 2005. The total enplanements and related operations forecasts for the 30 large hub airports for fiscal years 1995, 2000, and 2005 are presented on pages 149 and 151. By 2005, Chicago O'Hare is expected to reach 46.0 million enplanements and Dallas/Fort Worth is expected to reach 41.0 million. It is anticipated that Atlanta and Denver will reach 36.1 million and 27.3 million enplaned passengers, respectively, by the year 2005. The Denver forecasts assume the completion of a new air carrier airport in late 1993.

Total aircraft operations will reach 841,000 at Chicago O'Hare and 1,145,000 at Dallas/Fort Worth. Atlanta will reach 962,000 operations. These projections suggest that by the year 2005 Dallas/Fort Worth will become the busiest airport in the United States in terms of landings and takeoffs and the first airport to reach one million operations annually.

The average annual growth rates expected for the large hub airports for enplanements and operations for the 1989 to 2005 period are shown in the graphs on pages 150 and 152. Because of differences in the growth rates among airports, the relative ranks of the 30 hub airports in 2005 will differ from the rankings in 1989. For example, Phoenix and Las Vegas will be ranked 6th and 11th, considerably higher than the 12th and 19th places observed in 1989. Conversely, some airports (like New York LaGuardia, Boston, and Washington National Airport) which are experiencing some form of environmental or capacity constraints are expected to be ranked lower than their current 1989 positions. Large shifts could also occur if a major airline decides to use a

TOTAL PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS*
(IN THOUSANDS)

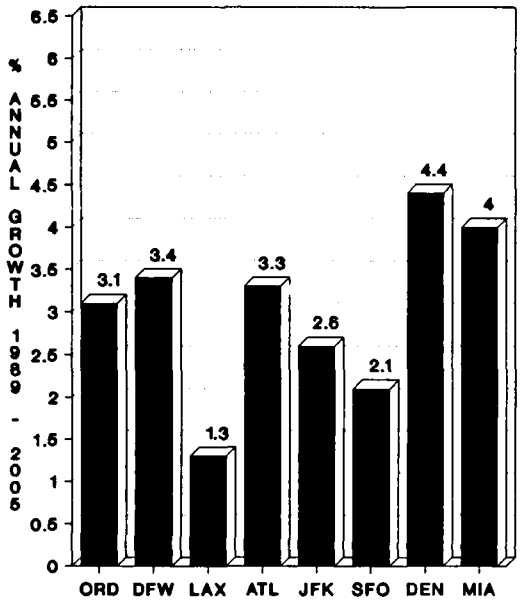
Airport	FY 1989	FY 1995	FY 2000	FY 2005
Chicago O'Hare	28,386	38,169	41,722	45,954
Dallas/Ft.Worth	23,820	29,853	35,230	40,979
Los Angeles	22,752	24,644	26,704	28,076
Atlanta	21,652	29,703	33,164	36,148
New York Kennedy	14,874	17,992	20,396	22,517
San Francisco	14,782	17,637	19,085	20,533
Denver**	13,732	17,646	21,990	27,271
Miami**	11,454	15,304	18,525	21,521
New York LaGuardia	11,195	13,510	14,893	16,276
Boston	11,088	14,432	16,459	18,760
Newark	10,455	15,665	19,467	22,241
Phoenix	10,202	14,907	19,098	23,288
Detroit	10,212	13,765	16,409	19,052
Honolulu	10,202	12,568	14,397	15,989
St. Louis	9,941	13,625	16,135	18,823
Minneapolis/St. Paul	9,149	12,836	15,519	18,162
Pittsburgh	8,581	11,300	13,459	15,690
Orlando	8,391	12,775	15,916	17,182
Las Vegas	7,799	12,364	16,066	19,489
Seattle-Tacoma	7,580	10,500	12,700	14,900
Charlotte	7,546	9,388	11,239	13,091
Houston Intercont'l	7,496	10,852	13,163	14,783
Washington National	7,269	7,663	7,799	7,936
Philadelphia	7,241	10,959	13,097	15,346
Salt Lake City	5,517	7,304	8,791	10,277
San Diego	5,467	7,533	9,043	10,834
Baltimore	5,098	7,388	8,044	8,611
Washington Dulles Int'l	4,879	8,554	10,350	12,146
Kansas City	4,598	5,886	7,813	9,741
Tampa	4,586	7,394	9,241	11,091

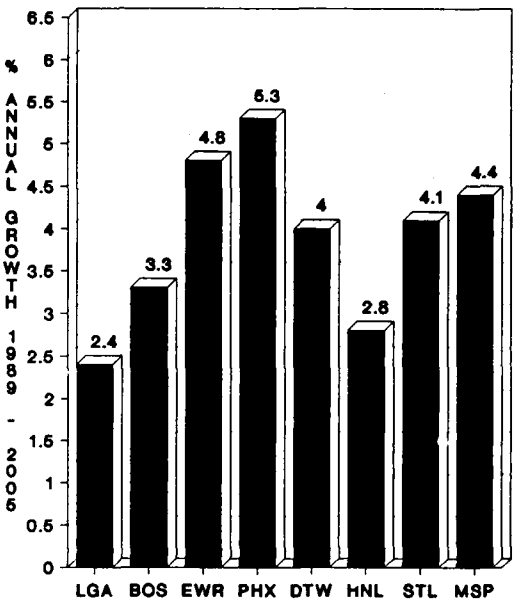
Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.

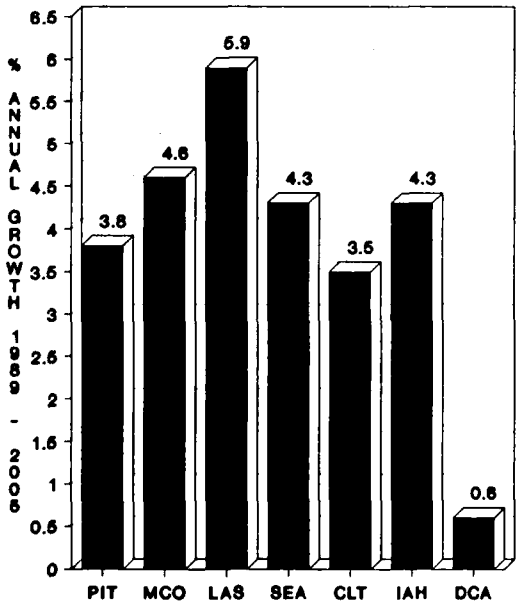
* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuters amd air taxis.

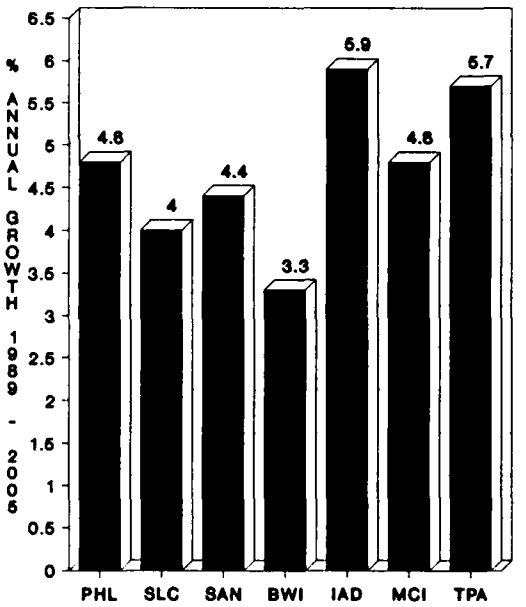
** Forecasts are based on individual hub forecast reports.

PASSENGER ENPLANEMENT GROWTH AT LARGE HUB AIRPORTS









TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS*
(IN THOUSANDS)

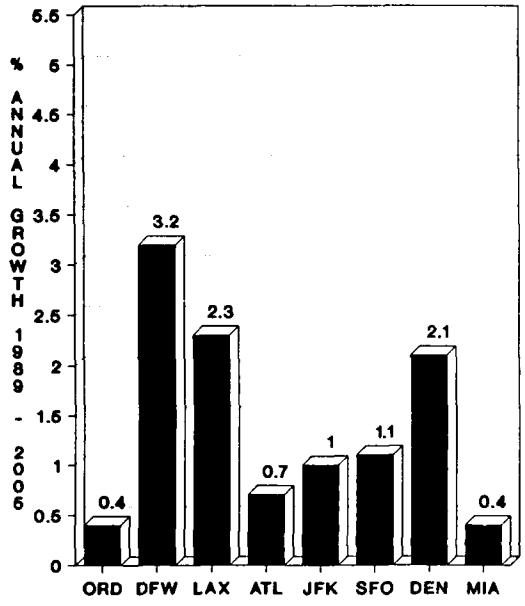
Airport	FY 1989	FY 1995	FY 2000	FY 2005
Chicago O'Hare	789	813	827	841
Dallas/Ft.Worth	694	923	1,031	1,145
Atlanta	670	868	931	962
Los Angeles	632	676	693	710
New York Kennedy	337	365	380	396
San Francisco	434	456	482	516
Denver**	468	518	586	654
New York LaGuardia	356	382	382	382
Boston	417	460	504	548
Miami**	378	526	586	638
Honolulu	406	463	485	511
Newark	377	427	445	464
Phoenix	480	554	602	650
Detroit	369	485	514	543
St. Louis	425	476	505	540
Minneapolis/St. Paul	376	462	522	586
Pittsburgh	379	462	509	562
Orlando	286	398	517	617
Las Vegas	378	496	538	566
Seattle-Tacoma	328	390	427	455
Charlotte	424	489	531	576
Houston Intercont'l	294	368	411	454
Washington National	316	354	374	394
Philadelphia	383	456	524	594
Salt Lake City	293	351	383	414
San Diego	207	238	264	290
Baltimore	307	355	406	457
Washington Dulles Int'l	235	410	451	490
Kansas City	239	259	326	392
Tampa	217	286	320	353

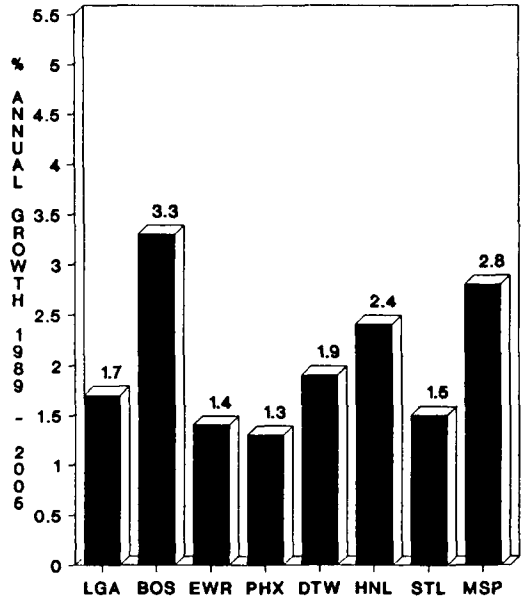
Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.

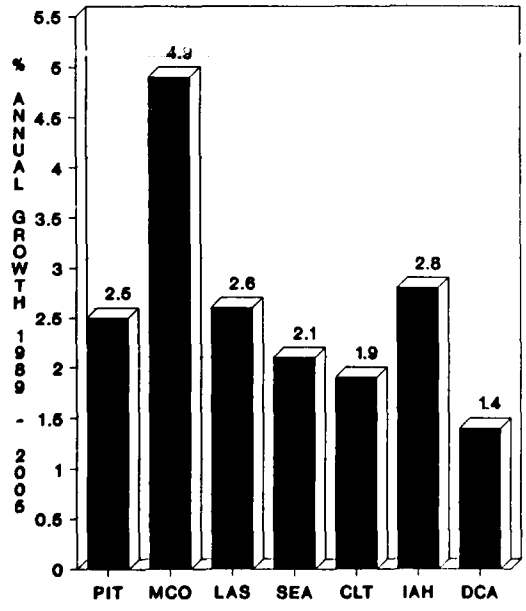
* Includes total itinerant and local operations performed by commercial air carriers, air taxis, military, and general aviation.

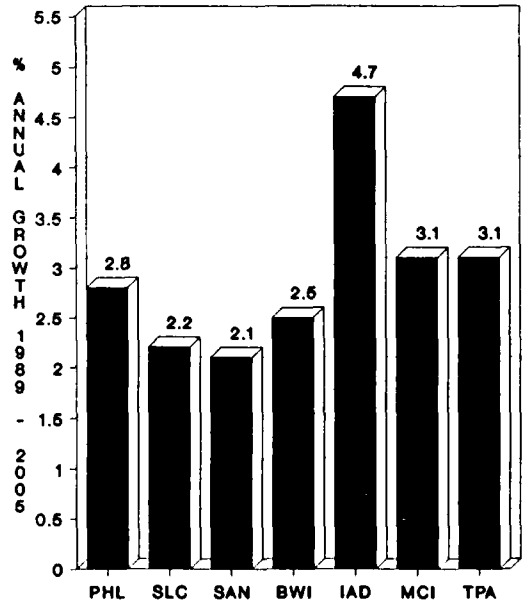
** Forecasts are based on individual hub forecast reports.

TOTAL AIRCRAFT OPERATION GROWTH AT LARGE HUB AIRPORTS









small or medium size airport as a hub, or to cease hubbing at an airport. Airline mergers, consolidations, and restructuring of routes may also affect the enplanements and operations forecasts, and, consequently, the relative ranks of the major hubs discussed in this section.

MEDIUM/SMALL HUB FORECASTS

The growth of enplanements and operations at the 41 medium and 64 small hub airports (relative to growth at the large hub airports) are compared in the tables on page 154. The first table shows that passenger enplanements at the medium hub airports are expected to increase somewhat faster than at the large hub airports. It is anticipated that some carriers will continue to develop or establish hubbing operations at medium or small hubs as alternatives to the larger more congested hubs. At the medium hubs, enplanements are forecast to grow at an annual average rate of 7.2 percent during the 1989 to 1995 period and at 4.0 percent between 1995 and 2005. Passenger enplanements at the small hubs are expected to increase at a slower rate than the medium hubs during the forecast period. The expected increases are 5.3 percent between 1989 and 1995 and 3.9 percent between 1995 and 2005.

As indicated in the second table, aircraft operations at both the medium and small hub airports are expected to grow faster than the large hubs during the 16-year period. Between 1989 and 1995, aircraft operations are expected to grow at 3.7 percent at the medium hubs and at 3.1 percent at the small hubs. During the 1995-2005 period, the growth rates are expected to be about 2.5 percent and 2.4 percent, respectively. The medium and small hubs are listed alphabetically by cities in Appendices J and K on pages 261 and 263.

SPECIAL HUB FORECASTS

Since 1978, FAA has sponsored a number of individual hub reports. The most recent are Denver and Miami. They were completed in December 1990. These studies were conducted in conjunction with FAA regions, state, and local planners, chambers of commerce, universities, and other interested parties.

These groups provide local aviation data, discuss general economic conditions sponsor and attend local seminars, and review preliminary reports. This procedure keeps the public informed of aviation activity in the local community, encourages local input and public participation in the planning process, and, consequently, enhances the final product.

The hub forecast studies examine the metropolitan statistical areas or standard consolidated statistical areas comprehensively. The areas generally have a major air carrier airport and several general aviation airports. Major objectives of these studies include: (1) examination of the interplay between the growth of aviation activity at the major airport and other airports in the area; (2) assessment of possible impacts of the growth of aviation activity in the area; and (3) examination of possible plans to accommodate the growth in aviation. Such plans may include reviews of possible distribution or redistribution of commercial air traffic and general aviation activity and the development of reliever or satellite airports.

The graphics on the following pages depict the relative size and growth of enplanements and operations, at the

SUMMARY OF PASSENGER ENPLANEMENTS AT HUB AIRPORTS
(Millions)

	1989	1995	2005	AVERAGE ANNUAL PERCENT CHANGE 1989-1995	1995-2005
Large Hubs	326.0	432.1	576.7	4.8%	2.9%
Medium Hubs	101.4	153.8	226.7	7.2	4.0
Small Hubs	34.6	47.1	69.1	5.3	3.9

SUMMARY OF AIRCRAFT OPERATIONS AT HUB AIRPORTS
(Millions)

	1989	1995	2005	AVERAGE ANNUAL PERCENT CHANGE 1989-1995	1995-2005
Large Hubs	11.9	14.2	16.7	3.0%	1.7%
Medium Hubs	9.0	11.2	14.4	3.7	2.5
Small Hubs	8.6	10.4	13.2	3.1	2.4

major airports with commercial service in the hubs discussed.

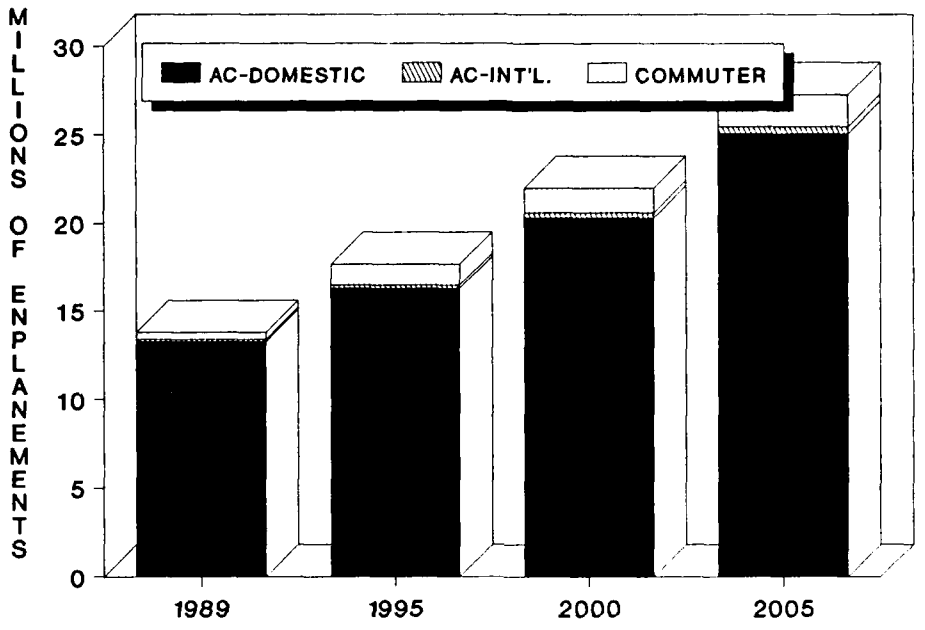
DENVER HUB/ OTHER COLORADO AIRPORTS

This section contains forecasts for the Denver Stapleton International Airport, eight general aviation airports in the Denver-Boulder Hub, and 14 other airports in Colorado which provide air carrier and/or regional/commuter passenger service. The Denver-Boulder Hub or the Denver-Boulder Consolidated Metropolitan Statistical Area (CMSA) is comprised of six adjacent counties located at the foot of the Rocky Mountains in central Colorado and extends over 4,503 square miles. It is the 22nd largest metropolitan area in the United States. The estimated population in 1989 was 1.89 million. By the year 2010, the population is expected to reach 2.60 million.

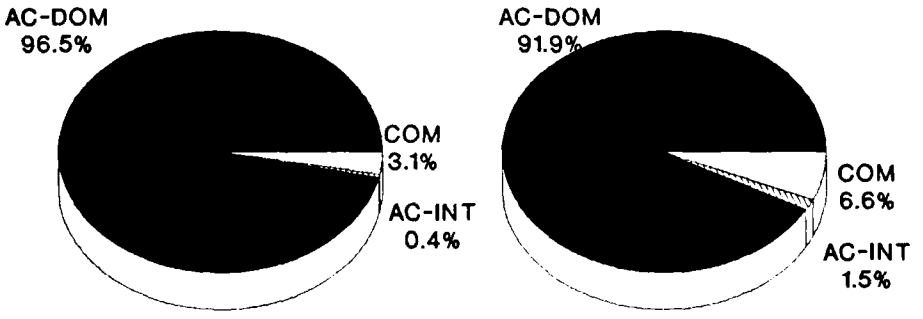
Denver, the "Mile High City" and capital of Colorado, was founded in 1858. Its early development stemmed from services provided to the miners who flocked to the area following the discovery of gold and, later, silver, in the mountains west of the city. Subsequent economic diversification

DENVER STAPLETON INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



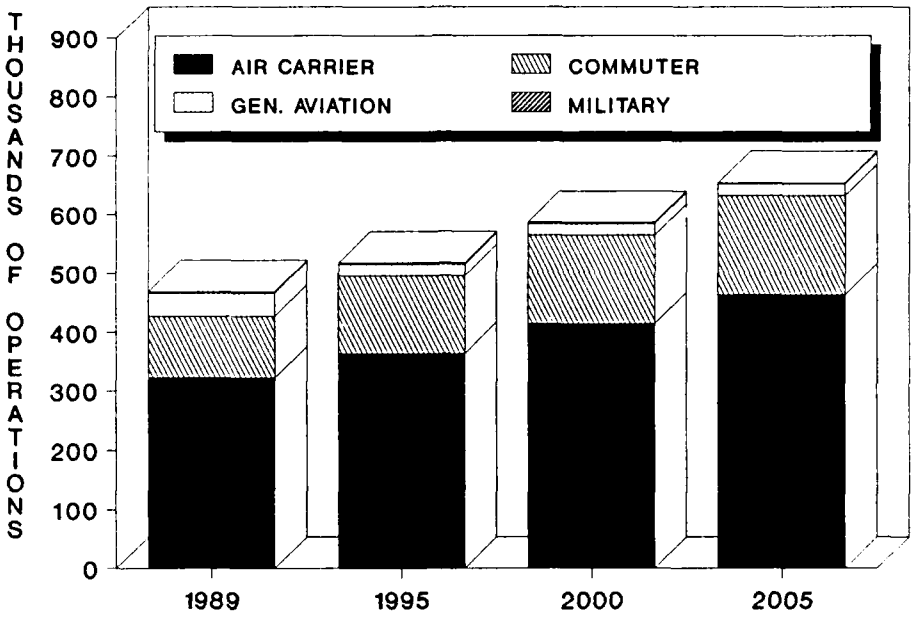
PERCENT OF TOTAL ENPLANEMENTS



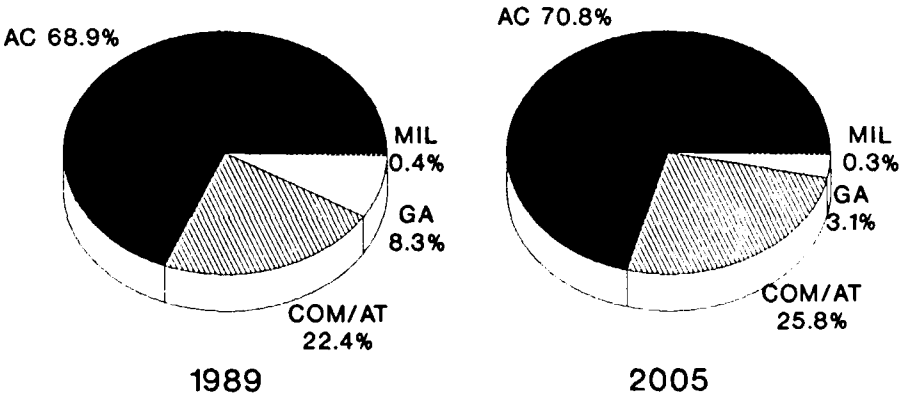
1989 2005

DENVER STAPLETON INTERNATIONAL AIRPORT

TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



furthered Denver's development as an important center for livestock sales, tourism, manufacturing, and agricultural trade. Tourism, high technology research, and manufacturing are expected to be the leading sources of future economic development.

Domestic, international, and regional/commuter air services as well as general aviation flight services are provided by 37 airports within the CMSA. Three FAA towers and one military tower provide air traffic control services. Denver Stapleton International, the major air carrier airport in the area, is located six miles from downtown Denver. Strategically located only 346 miles west of the exact geographic center of the United States, the airport developed into a major transportation hub in the national air transportation system for flights between the east and west coasts and other metropolitan areas. The new Denver International Airport which is under construction 18 miles northeast of the central business district is scheduled to begin operations in October 1993. All operations at Denver Stapleton will cease with the opening of the new airport.

Denver is served by 13 domestic passenger service air carriers, two international (excluding Canadian) passenger service carriers, six regional/commuter airlines, 10 charter carriers, and nine scheduled cargo service carriers. In 1989, two airlines (United and Continental) accounted for nearly 74 percent of total passenger enplanements at the airport.

Total passenger enplanements in the Denver Hub are projected to reach 27.3 million by the year 2005. This number is nearly double the 13.7 million passengers recorded in 1989. Commercial aircraft activity in the Denver Hub is expected to reach nearly 624,100 by the year 2005, about 51 percent higher than the 1989 total of 413,900 commercial aircraft operations handled in 1989. Itinerant general aviation aircraft operations in the Denver Hub are forecast to increase by 2.4 percent between 1989 and 2005. In comparison, local general aviation operations are expected to grow by 1.3 percent annually.

In conjunction with the Denver Hub study, the FAA was requested to provide forecasts for 14 additional airports in the State of Colorado which currently provide air carrier and/or regional/commuter air service. Total enplanements at these airports are expected to reach 2.8 million by the year 2005, nearly triple the million reached in 1989. Total aircraft operations are forecast to reach 897,800 by 2005, a 50 percent increase over the 1989 total of 599,700 aircraft operations.

MIAMI HUB

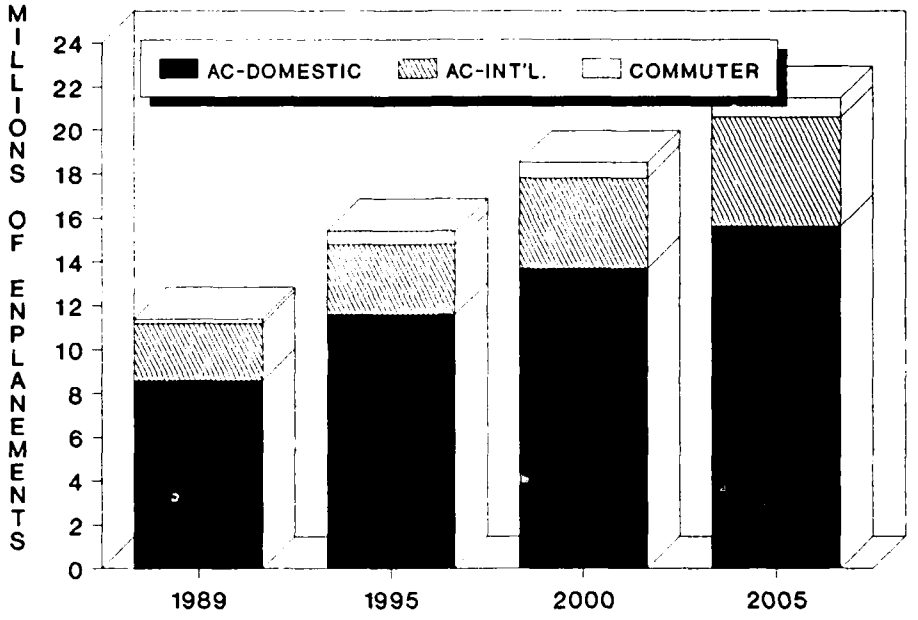
The Miami Hub is located on Biscayne Bay at the mouth of the Miami River in southeastern Florida. The Miami-Fort Lauderdale Consolidated Metropolitan Statistical Area (CMSA) consists of Broward and Dade counties and it covers 3,261 square miles. In 1989, the CMSA had a population of 3.1 million. By the year 2005, the population is projected to reach 3.5 million, an increase of 12.9 percent.

Miami was incorporated as a city in 1896. From a primarily agricultural center, the Miami CMSA has become a major commercial and financial center in the South, and a major tourist resort attracting visitors from around the world. Miami is the primary port of entry to the U.S. from the Caribbean and South America. In addition to being a major air transportation hub, the CMSA is home to the two largest cruise ports in the U.S. located in the Port of Miami and Port Everglades.

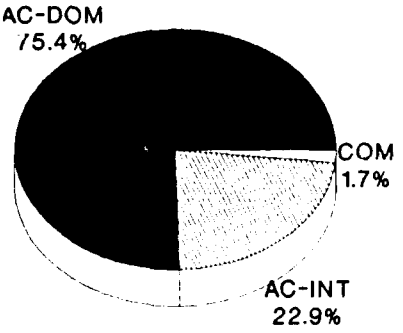
There are 10 public use airports in the Miami CMSA. Of these, seven have FAA-operated air traffic control towers.

MIAMI INTERNATIONAL AIRPORT

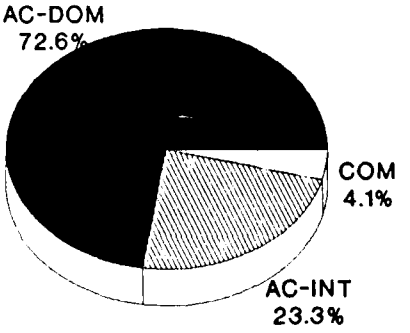
PASSENGER ENPLANEMENTS



PERCENT OF TOTAL ENPLANEMENTS



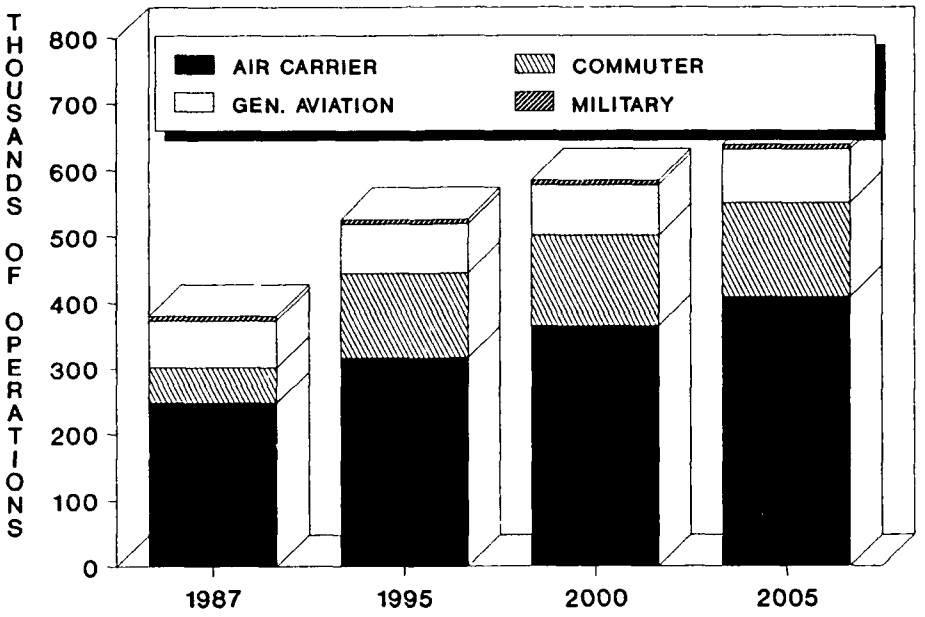
1989



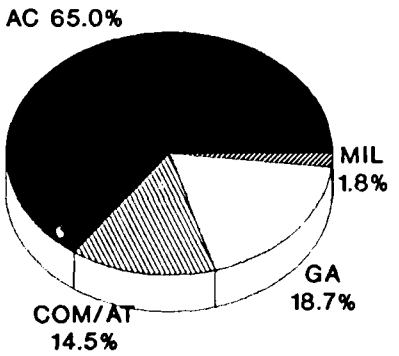
2005

MIAMI INTERNATIONAL AIRPORT

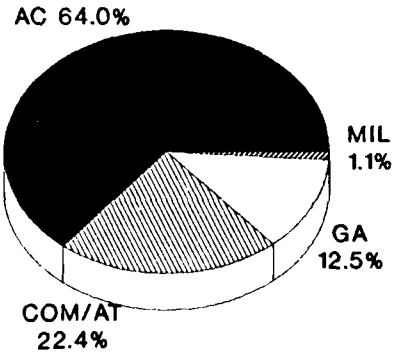
TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



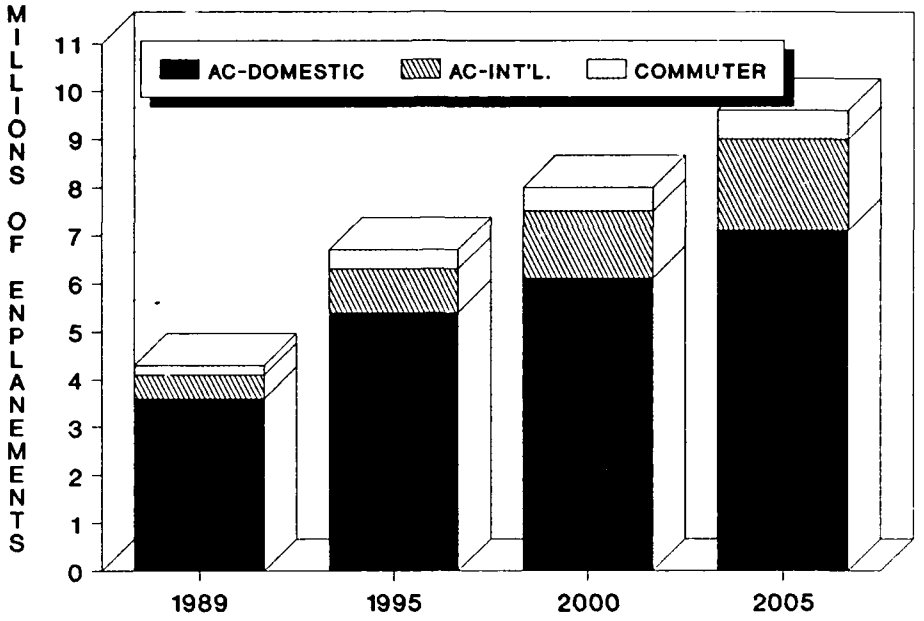
1989



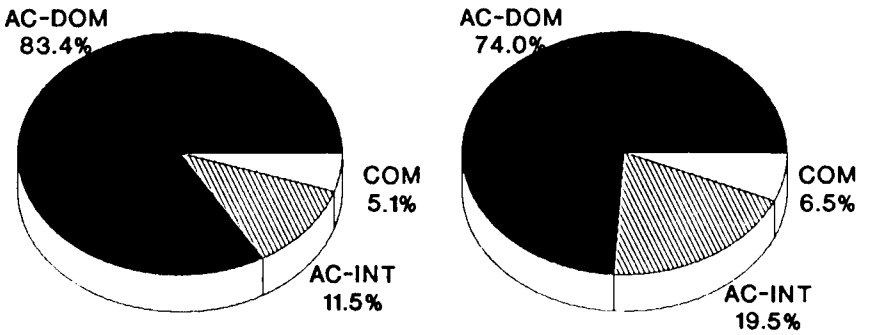
2005

FT. LAUDERDALE INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



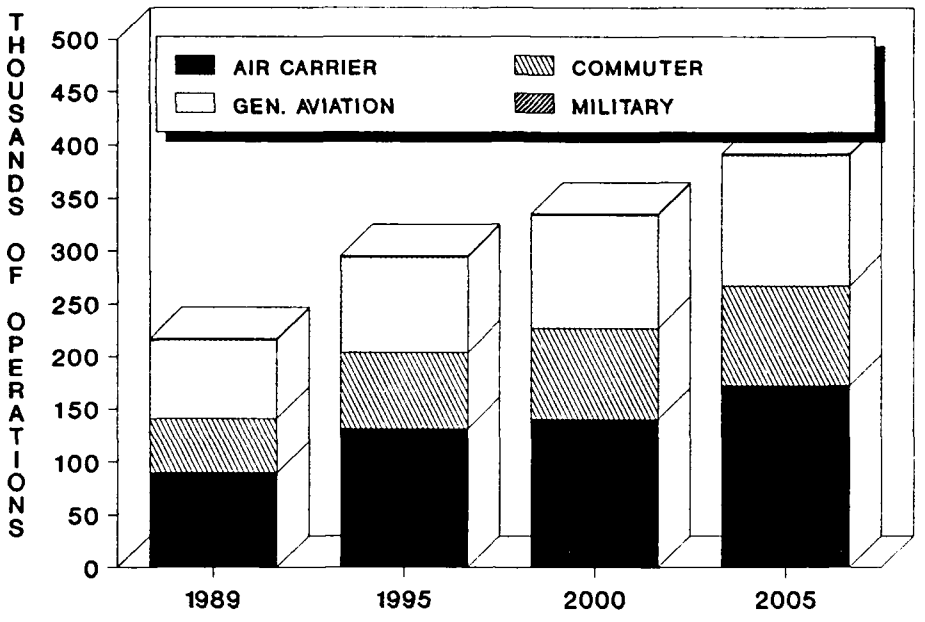
PERCENT OF TOTAL ENPLANEMENTS



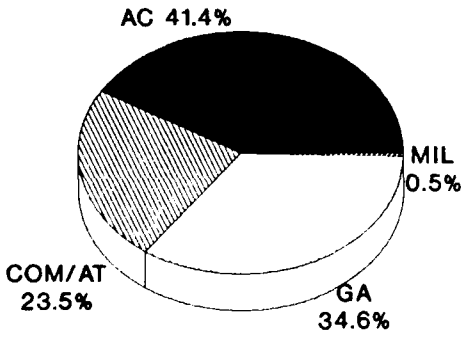
1989 2005

FT. LAUDERDALE INTERNATIONAL AIRPORT

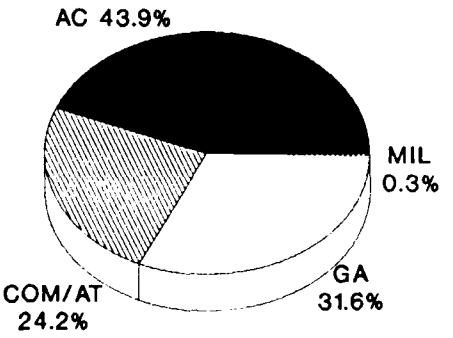
TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



1989



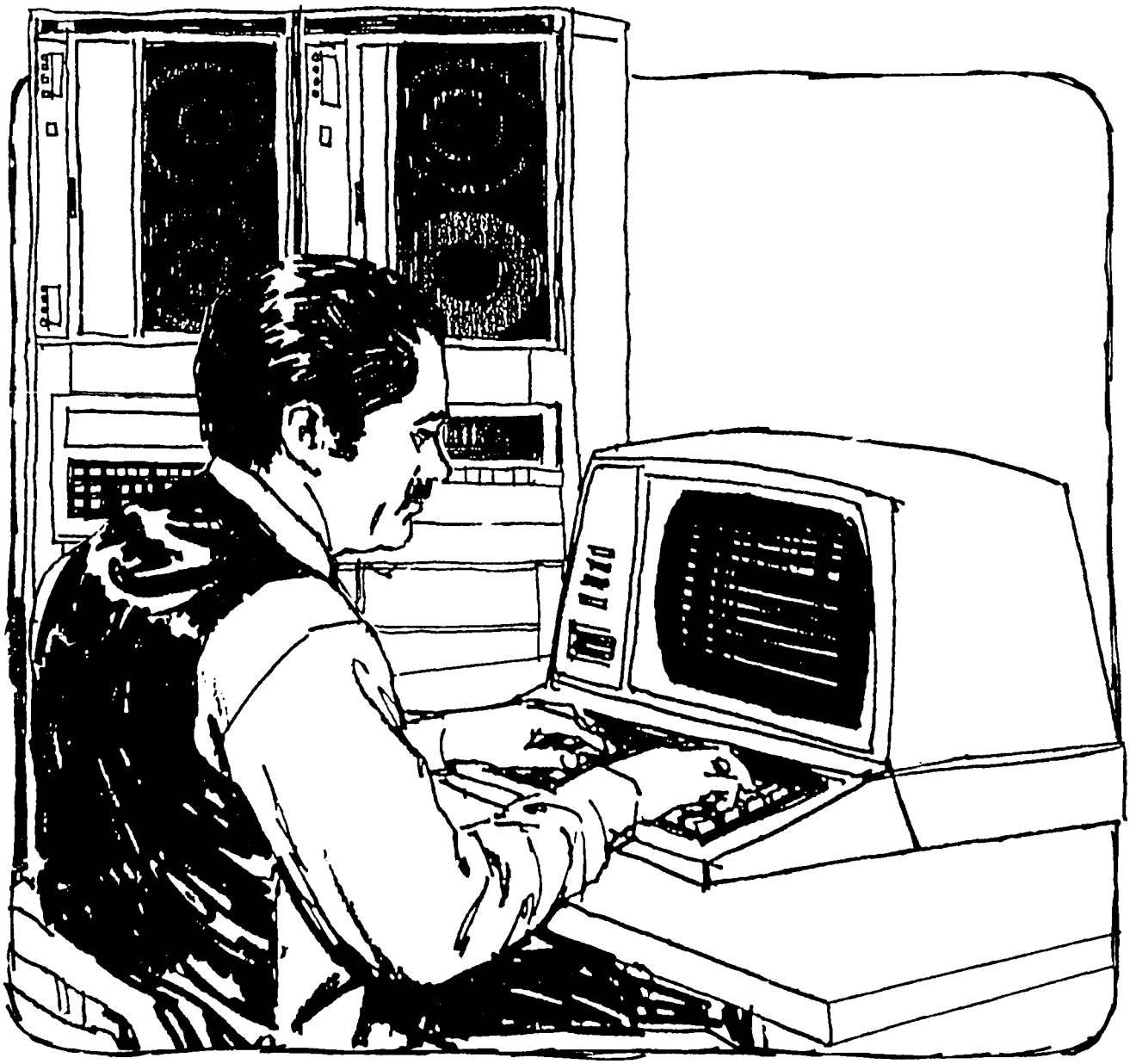
2005

Domestic and international commercial air carrier services are provided at Miami International Airport and Fort Lauderdale/Hollywood International Airport. Although the area is served by several major U.S. carriers, there is no dominant carrier. (For example, in 1989, Delta and Eastern each carried less than 18 percent of total passengers.) General aviation flight activities at the Miami hub occur at the seven towered airports and three non-towered airports.

Total passenger enplanements at the Miami hub is projected at 31.2 million in the year 2005, almost double the 15.8 million passengers enplaned in 1989. Commercial aircraft operations are forecast to increase to 817,900, about 79.4 percent more than the 455,800 commercial aircraft operations reported in 1989.

Copies of the Denver and Miami hub studies are available from the Forecast Branch, Office of Aviation Policy and Plans, APO-110 (Phone 202-267-3355).

CHAPTER IX
FORECAST ACCURACY



CHAPTER IX

FORECAST ACCURACY

The Federal Aviation Administration (FAA) provides 12-year forecasts of workload measures annually for manpower and facility planning. The FAA has developed forecast models and established a forecast process that attempts to anticipate external events that may affect the industry. For example, the National Academy of Sciences, Transportation Research Board (TRB) organized a special workshop on aviation forecasting methodology in the spring of 1989. This workshop was sponsored by the FAA for the purpose of examining techniques and practices currently used by the FAA and other aviation forecasters and to explore other methodological approaches. The workshop focused on the forecasting process and ways to improve the reliability and utility of forecasting results. The seven major conclusions of the workshop were:

(1) The present FAA forecast procedure appears to produce results that are satisfactory for the purposes intended--anticipation of workload and facilities requirements ten years ahead.

(2) While past FAA forecasts, particularly in the years since airline deregulation, have underestimated traffic growth, inaccurate forecasting is not a primary cause of the present shortage of capacity in the air transport system. The chief reasons are lack of funding and inability to achieve consensus on the need and timing for airport and air traffic control system expansion.

(3) The FAA forecasting process can be used for a wider range of purposes than it is now--for example, exploring contingencies, alternative scenarios, and prospective policies and programs.

(4) For longer-term forecasts, FAA may wish to consider (a) expanded use of demographic and employment data, (b) use of megatrends to assess the role of aviation in a more comprehensive view of society, and (c) predictions of fossil fuel supply and demand.

(5) For its short-term models FAA may wish to explore ways to utilize variables such as airline yield, price, unit costs, and market segmentation.

(6) There is a need for broader and better data on market developments and travel behavior.

(7) In developing its forecasts FAA may wish to expand its program to obtain a broad consensus on critical assumptions from a cross-section of industry representatives (airlines, other airspace users, aircraft manufacturers, and airports).

Copies of the proceedings of this workshop are available from the TRB (Circular Number 348, August 1989). It should be recognized, however, that no

forecast model or forecasting process is absolutely accurate and that there will always be unanticipated events (e.g., the Iraqi invasion of Kuwait) that will alter our forecasts.

The following two tables provide some measure of the accuracy of FAA workload forecasts. They compare forecast data for both the short-term, one to five years, which is the critical period for manpower planning, and for 10 years out. Instrument operations and aircraft handled are two key FAA workload measures. The forecast error in the short term tends to be minimal, while the ten year out forecast error is high due to two external events that had not been anticipated but had long-term impacts on the aviation system--the more than doubling of fuel prices due to the OPEC actions taken in 1979-1980 and the failure of general aviation to respond to the economic recovery. Also, actual 1989 activity was affected by the Eastern Air Line strike which lowered air carrier operations by almost 400,000.

THE FAA AVIATION FORECASTING PROCESS

INTRODUCTION

The FAA's forecasting process is a continuous and interactive one that involves the FAA Forecast Branch, other FAA Offices and Services, other Government agencies, and aviation industry groups. In addition, the process uses various economic and aviation data bases, econometric models and equations, and other analytical techniques.

Forecasting aviation activity is an essential component of the FAA's planning process. The forecasts are used to determine staffing levels and capital expenditures that will be needed to accommodate growth of activity in a safe and efficient environment. The forecasts are also used for short-term budget preparation, cost-benefit analyses, and safety analyses. The relative importance of the forecasting function in the planning process can be gauged by examining the major changes being made to the National Airspace System during the next 10 years. These changes are being made, in large part, to accommodate the projected growth in air traffic.

In rebuilding the air traffic control and air navigation systems, the FAA is installing new aircraft landing systems, developing new radar and communication systems, and upgrading weather services to aircraft operators. Because of the sizeable investments being made in the National Airspace System, it is essential that the FAA develop and utilize the most accurate and reliable forecasts possible. Consistently large forecast errors will lead to inefficient allocation of scarce resources. Thus, review and evaluation of the FAA forecasting procedures, models, forecast assumptions, and forecast results constitute an essential part of the process.

SYSTEM BACKGROUND

As part of the need for ensuring safe and efficient operation of the National Airspace System, FAA operates 403 airports with air traffic control towers, 22 air route traffic control centers, and, as of October 1, 1990, 180 flight service stations. Many of the nonautomated flight service stations (FSS's) will be absorbed into 61 new automated facilities (AFSS's). However, given the recent Congressional to implement a system of auxiliary flight service stations in addition to the 61 AFSS's, some of the FSS's currently scheduled to be closed or consolidated may remain open . Thus, the FAA facilities per-

FAA INSTRUMENT OPERATIONS FORECAST EVALUATION
(Millions)

		Forecast - Years Out					
Year	Actual	1	2	3	4	5	10
1986	40.5	40.6	40.9	40.8	42.6	44.8	46.2
1987	43.4	41.7	42.3	42.3	42.4	44.3	45.9
1988	44.3	45.4	43.0	43.8	43.6	44.2	49.9
1989	45.2	45.8	47.2	44.2	45.7	45.5	53.9
1990	46.8	46.4	47.7	49.1	45.4	47.3	54.2
1991		47.8	48.0	49.5	50.7	46.4	52.4
1992			48.9	49.6	51.3	51.8	51.5
1993				50.1	50.8	52.5	50.3
1994					51.4	52.2	52.0
1995						52.9	52.2
2000							58.9

PERCENT ERROR
(Forecast/Actual)

1986		0.3	1.0	0.7	5.2	10.6	14.1
1987		(3.9)	(2.5)	(2.5)	(2.3)	2.1	5.8
1988		2.5	(2.9)	(1.1)	(1.6)	(0.2)	12.6
1989		1.3	4.4	(2.2)	1.1	0.6	19.2
1990		(0.8)	1.9	4.9	(3.0)	1.1	13.6

Note on how to read this table: In 1989 we forecast 46.4 million operations would occur in 1990. In fact 46.8 million operations were recorded meaning the forecast was 0.8 percent lower than actual. In 1988 we forecast 47.7 million operations would occur in 1990. This forecast was 1.9 percent higher than actual.

FAA ARTCC AIRCRAFT HANDLED FORECAST EVALUATION

(Millions)

		Forecast - Years Out					
Year	Actual	1	2	3	4	5	10
1986	34.2	34.0	33.9	33.1	32.8	33.6	36.3
1987	35.8	35.4	35.1	35.0	34.0	34.0	39.6
1988	36.0	37.0	36.6	36.1	36.1	35.1	42.8
1989	36.6	37.2	38.0	37.6	37.2	37.4	42.0
1990	37.6	37.8	38.2	39.2	38.7	38.4	42.2
1991		38.5	39.1	39.7	40.3	39.6	40.3
1992			39.6	40.1	40.8	41.4	39.3
1993				40.6	41.0	41.6	40.7
1994					41.5	41.9	43.6
1995						42.7	43.6
2000							47.1

PERCENT ERROR
(Forecast/Actual)

1986		(0.6)	(0.9)	(3.2)	(4.1)	(1.7)	6.1
1987		(1.1)	(2.0)	(2.2)	(5.0)	(5.0)	10.6
1988		2.8	1.7	0.3	0.3	(2.5)	18.9
1989		1.6	3.8	2.7	1.6	2.2	14.7
1990		0.5	1.6	4.3	2.9	2.1	12.2

form a large and diverse number of services for the aviation community.

The FAA towers provide sequencing and separation services to pilots and aircraft arriving at or departing from individual airport facilities. These services are provided to various categories of aircraft: air carriers, commuters, air taxis, general aviation, and military. The arrivals and departures (landings and takeoffs) are generally referred to as aircraft operations. The arrivals and departures are further classified as itinerant or local operations depending on the purpose of the flight or the distance between the airports from which the landings and takeoffs were made. These operations are measures of workload or activity at individual airports. The sum of these operations at all towered airports constitute the national counts of aircraft operations.

Another important workload measure at FAA tower airports is the number of instrument operations. This is essentially an aircraft operation performed in accordance with an instrument flight rule (IFR) flight plan or an aircraft flight where IFR separation between aircraft is provided by the facility. At times, advisory services may be offered to aircraft flying under visual flight rules (VFR). Instrument operations are further subdivided into (1) primary instrument operations (separation and sequencing services provided to aircraft landing at the airport providing the service), (2) secondary instrument operations (services provided to aircraft landing at a nearby airport), and (3) overs (services provided to aircraft which are transiting the facility's controlled airspace without landing in the area).

Each air route traffic control center (ARTCC) controls aircraft which are flying under instrument flight rules in the center's designated geographic control area. The workload measures for the centers are the numbers of IFR aircraft handled. The IFR counts are categorized by user groups.

Flight service stations provide a variety of services to the aviation community. They collect and disseminate meteorological and weather information, provide briefings to pilots, and provide assistance in emergencies to lost, disoriented, or downed airmen. The workload measures at flight service stations are weighted sums of the number of flight plans filed, pilot briefings provided, and aircraft contacted.

This document, "FAA Aviation Forecasts, Fiscal Years 1991-2002, February 1991," contains 133 distinct time-series variables. (The number does not include derived subtotals and totals.) Of these, four economic independent variables are obtained from sources external to the FAA. The FAA analysts or forecasters have no control over these truly exogenous variables. There are 12 quantifiable air carrier forecast assumptions and four quantifiable regional/commuter carrier forecast assumptions. Within justifiable limits, these forecast assumptions are under the control of the analysts. There are 83 aviation variables that, strictly speaking, are not FAA workload measures; but these influence the true workload measures in one way or another. Finally, there are 30 aviation variables which are the workload measures used by the FAA for policy and planning considerations and for manpower and investment planning.

The table at the end of this chapter contains a list of the variables and the sources for the historical data and their relationship to different aspects of the forecast process. Forecasts of the economic variables and the military fleet and hours flown are developed outside the FAA. All other forecasts are developed by the FAA. From the preceding discussion, it follows that the FAA must explicitly consider at least 133 variables when producing a set of national forecasts.

Research undertaken in the early-and mid-1970's indicated that some measures of economic activity (such as gross national product or total employment) and some measures of prices (for example, aircraft prices and aviation fuel prices) were useful predictors of aviation activity. Some unique events (including the strike in August 1981 and the prolonged depressed state of the general aviation manufacturing industry) have altered the relationships between the key aviation variables and the economic variables used previously. It has been difficult, therefore, to produce economic or econometric models which predict aviation activity with the same degree of reliability as the models which were developed in earlier periods. Thus, for the present, the forecasters must rely to a greater degree on subjective judgment, evaluation, and expertise than was required previously. This is not at all unusual in times of significant changes in a volatile industry.

THE FAA FORECASTING PROCESS

The FAA forecasting process is an interactive system that combines econometric and time series model results with aviation industry forecasts, expert opinions, and anticipated policy impacts to derive a set of FAA aviation forecasts that are used in the decisionmaking process. The following flow diagram shows a generalized version of the FAA aviation forecasting process.

The first step in developing the forecasts is to enter the economic and demographic variables into a set of econometric models or equations that represents a simplified version of the real world. The economic and demographic variables (the truly independent and exogenous variables) are developed outside the FAA and, therefore, are not within the analysts' control. It is evident that the degree of accuracy of the forecasts of aviation activities depends on both the accuracy of the forecasts of the independent variables and the ability of the models to portray activities in the real world.

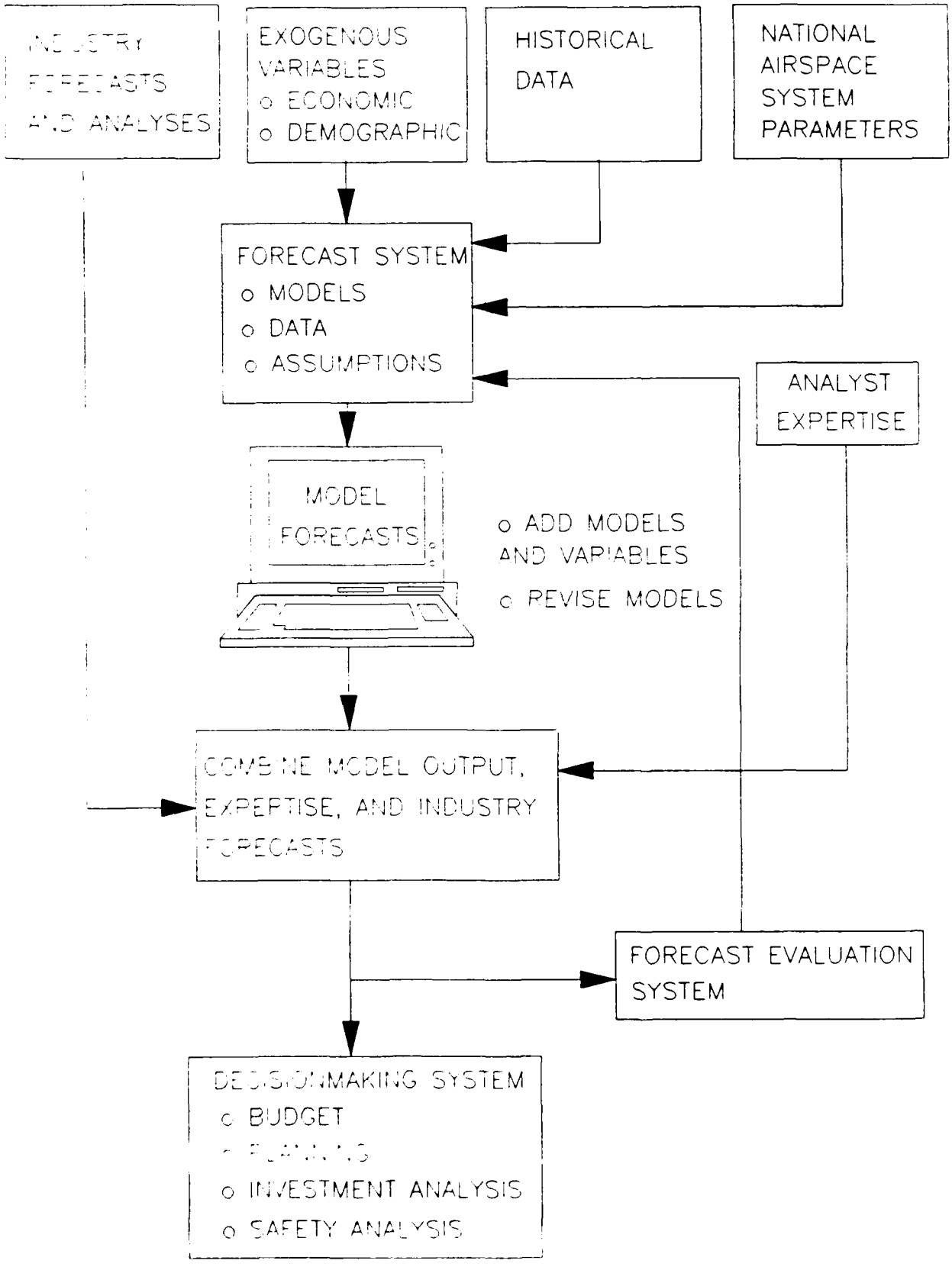
The mechanical execution of forecast models is only the first step in producing a set of forecasts. In general, these models and equations are simple portrayals of a complex system. They cannot account for a number of political, social, psychological, and economic variables and all the interrelated actions and reactions that eventually lead to a particular set of results. Consequently, the initial model results are reviewed, revised, and adjusted to reflect the analysts' best judgment of the impacts of the events which are occurring or are expected to occur during the forecast period.

The FAA forecasting process is both continuous and iterative. As such, it is important to evaluate the forecast results and to determine the basis of the deviations of the forecast values from the actual values observed in the real world. The analysis of the errors generally identifies the causes of the deviations and helps in determining the proportion due to improper model specifications, erroneous forecasts of independent variables, erroneous forecast assumptions, or incorrect analysts' judgments and opinions. If warranted, the forecast error analysis may lead to a reformulation of the model and to additions or deletions of independent variables, revisions of forecast assumptions, and/or changes in analysts' opinions and judgments about future events.

FORECAST EVALUATION

It is essential that the FAA forecasts of the demand for services at the FAA towers, air route traffic control cen-

FAA FORECASTING SYSTEM



ters, and the flight service stations be accurate. Large forecast errors can lead to inefficient allocation of resources which, in turn, could lead to capacity constraints and delays or to excess capacity in the National Airspace System. For this reason, FAA must continuously evaluate the forecasting process and its results.

The evaluation of the forecast process proceeds on several fronts. On a monthly basis, FAA tracks its short-term forecasts of aircraft operations, instrument operations, aircraft handled, and flight services vis-a-vis the actual counts at the facilities. This tracking system alerts FAA management to unexpected deviations from the trends suggested by the forecasts. Inquiries are then initiated to determine the cause(s) of the differences and revised short-term forecasts may be generated, if necessary.

To help the analysts make correct decisions and informed judgments when developing the forecast assumptions, FAA holds a series of meetings with industry representatives to discuss industry trends, recent developments, and possible future courses of events. Every 2 years, for example, FAA, in cooperation with the National Academy of Sciences, Transportation Research Board (TRB), sponsors a "forecast assumptions workshop." This workshop is attended by 70 to 80 industry planners and forecasters representing the airlines, aircraft manufacturers, engine manufacturers, and other industry groups.

The participants in various subgroups identify specific assumptions about the short-term and long-term future trends of the economic and aviation variables that are important to their segments of the industry, indicate why these are considered important, and show why specific trends are anticipated. After discussing the assumptions, the entire group attempts to reach a consensus about the key variables affecting the industry and the most likely future courses of these variables. Finally, the TRB prepares and publishes a workshop report. The participants benefit from the discussions and the analysts have the TRB workshop report as a benchmark for preparing forecasts or for evaluating forecasts prepared by other organizations. FAA uses this forum and the workshop report in preparing and in evaluating its aviation forecasts.

Formal and informal meetings with individuals and representatives of specific industry groups represent other avenues used by the FAA to promote dialogue and discussion with the aviation community and to solicit input and comments. Separate meetings are held regularly with the aircraft manufacturers, as a group, with members of the Air Transport Association, and with members of the General Aviation Manufacturers Association In addition, FAA analysts maintain one-on-one contact with industry representatives.

Another intermediate step in the FAA aviation forecast process is the public dissemination of the forecast results, solicitation of industry comments, and critique of the forecasts. The main avenue used for this purpose is the "FAA Aviation Forecast Conference" held annually in February or March. The 500 to 600 participants at the conference generally include airline executives, aircraft and engine manufacturers, consumer groups and other industry representatives, and the news media. To the maximum extent possible, FAA responds to questions raised about the forecasts both during and after the conference.

An important part of the conference is the opportunity for various segments of the aviation community to make technical presentations on a variety of topics of interest to the aviation community. The FAA aviation forecast conference establishes avenues of communication through which FAA releases its forecast to the aviation community and the public and receives comments, criticisms, and feedback

about the forecasts. The FAA also receives valuable information and insights through the papers presented at the forecast conferences.

Because the U.S. general aviation industry has now entered a stage of growth that should be examined by the industry and FAA, the FAA is sponsoring the First Annual FAA General Aviation Conference in March, 1991. There are likely to be both opportunities as well as alternatives to be examined and, perhaps, avoided. Increasing concentration in the air carrier industry and congestion at hub airports have resulted in a favorable climate for growth of business aviation. Increased air carrier and commuter activity have placed additional demand for commercial pilots. This has resulted in additional training requirements. The pilot training process is an important step in aviation growth quite apart from the demand generated for replacement single engine piston training aircraft. It is the source of future commercial, airline transport, and perhaps, military pilots. This conference will open new avenues of communication for the FAA with this significant segment of the aviation community.

FAA also seeks to improve the forecast accuracy and credibility by inviting FAA regional and state participation in the forecast process. For example, facility level terminal area forecasts and flight service station forecasts are circulated to FAA regions for review and comments. The comments and suggested changes are incorporated in the final facility level reports. In the case of the terminal area forecasts, the FAA regions have the capability to make changes by computer. The final facility level forecasts derived by this procedure must be consistent with the national forecasts.

Periodically, FAA prepares a technical report that compares the accuracy of the forecasts of key workload measures with the accuracy of forecasts of economic variables prepared by major forecasting services. Based on the results of these studies, the FAA forecasts compare quite favorably with those produced by these major forecasting services. (For details, see APO Bulletin, "Accuracy of FAA Forecasts," APO-88-1, May 1988.)

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
ECONOMIC:	
Gross national product (GNP)	OMB, DRI, Evans, WEFA
Consumer price index (CPI)	OMB, DRI, Evans, WEFA
Oil and gas deflator	OMB, DRI, Evans, WEFA
Fuel price index	OMB, DRI, Evans, WEFA
AIR CARRIER:	
FORECAST ASSUMPTIONS	
Domestic Operations:	
Average seats per aircraft	RSPA
Average passenger trip length	RSPA
Revenue per passenger mile (current $)	RSPA
Revenue per passenger mile (1982-84 $)	Computed
Average jet fuel prices (current $)	RSPA
Average jet fuel prices (1982-84 $)	Computed
International Operations:	
(Same as Domestic)	(Same)
SCHEDULED PASSENGER TRAFFIC	
Domestic:	
Revenue passenger miles (RPM's)	RSPA
Revenue passenger enplanements	RSPA
Available seat miles	RSPA
Load factors	RSPA
International:	
Revenue passenger miles by Regions	RSPA
Revenue passenger enplanements by Regions	RSPA
Available seat miles	RSPA
Load factors	RSPA
FLEET	
2-Engine narrowbody	FAA/AVN-120
3-Engine narrowbody	FAA/AVN-120
4-Engine narrowbody	FAA/AVN-120
2-Engine widebody	FAA/AVN-120
3-Engine widebody	FAA/AVN-120
4-Engine widebody	FAA/AVN-120

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
HOURS FLOWN BY EQUIPMENT	
(Same as Fleet)	RSPA
FUEL CONSUMED	
Jet:	
Domestic air carriers	RSPA
International air carriers	RSPA
General aviation	FAA/APO-110
Aviation Gasoline:	
Air carriers	FAA/APO-110
General aviation	FAA/APO-110
REGIONAL/COMMUTER:	
FORECAST ASSUMPTIONS	
Average seats per aircraft	RSPA
Average passenger trip length (48 states)	RSPA
Average passenger trip length (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Average load factor	RSPA
PASSENGER TRAFFIC	
Revenue passenger enplanements (48 states)	RSPA
Revenue passenger enplanements (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Revenue passenger miles (48 states)	RSPA
Revenue passenger miles (Hawaii, Puerto Rico, Virgin Islands)	RSPA
FLEET	
Less than 15 seats	FAA/AVN-120
15 to 19 seats	FAA/AVN-120
20 to 40 seats	FAA/AVN-120
More than 40 seats	FAA/AVN-120
GENERAL AVIATION:	
FLEET	
Single engine piston aircraft	FAA/AMS-420
Multi-engine piston aircraft	FAA/AMS-420
Turboprop aircraft	FAA/AMS-420
Turbojet aircraft	FAA/AMS-420
Piston-powered rotorcraft	FAA/AMS-420
Turbine-powered rotorcraft	FAA/AMS-420
Other general aviation aircraft	FAA/AMS-420

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
NUMBER OF AIRCRAFT BY REGION	
Total aircraft in each of nine FAA Regions	FAA/AMS-420
HOURS FLOWN	
Hours flown by equipment type (See general aviation fleet)	FAA/AMS-420
FUEL CONSUMED	
Fuel consumed by equipment type (See general aviation fleet)	FAA/APO-110
ACTIVE PILOTS:	
Students	FAA/AMS-420
Private pilots	FAA/AMS-420
Commercial	FAA/AMS-420
Airline transport	FAA/AMS-420
Helicopter	FAA/AMS-420
Glider	FAA/AMS-420
Other	FAA/AMS-420
Instrument rated	FAA/AMS-420
FAA WORKLOAD MEASURES:	
FAA TOWERS	
Number of FAA Towers	FAA/AMS-420
Aircraft Operations:	
Air carrier itinerant operations	FAA/AMS-420
Air taxi/commuter itinerant operations	FAA/AMS-420
General aviation itinerant operations	FAA/AMS-420
Military itinerant operations	FAA/AMS-420
General aviation local operations	FAA/AMS-420
Military local operations	FAA/AMS-420
Instrument Operations:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
Non-IFR Instrument Operations:	
Terminal control areas	FAA/AMS-420
Expanded radar service areas	FAA/AMS-420

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
AIR ROUTE TRAFFIC CONTROL CENTERS	
IFR Departures:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
IFR Overs:	
(Same as IFR departures)	FAA/AMS-420
FLIGHT SERVICE STATIONS	
IFR-DVFR flight plans originated	FAA/AMS-420
VFR flight plans originated	FAA/AMS-420
Pilot briefings	FAA/AMS-420
Air carrier aircraft contacted	FAA/AMS-420
Air taxi/commuter aircraft contacted	FAA/AMS-420
General aviation aircraft contacted	FAA/AMS-420
Military aircraft contacted	FAA/AMS-420
IFR-DVFR aircraft contacted	FAA/AMS-420
VFR aircraft contacted	FAA/AMS-420
MILITARY:	
FLEET	
Jet	DOD
Turboprop	DOD
Piston	DOD
Helicopter	DOD
HOURS	
Hours flown by equipment (See Fleet)	DOD

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS FISCAL YEARS 1991–2002

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS

FISCAL YEARS 1991 - 2002

Chapter X provides the detailed data for the National Aviation and FAA workload series forecasted by the FAA Office of Aviation Policy and Plans. The following should be noted:

- o Table 10 - Contains the unduplicated passenger traffic reported by U.S. scheduled air carriers reporting on RSPA Form 41 and commuter carriers reporting on RSPA Form 298-C.

- o Table 11 - Those carriers contained in the Air Carrier forecast data base are listed in Appendices A and B.

  - Includes the following traffic which is also reported as commuters/regionals traffic in Table 19.

	ENPLANEMENTS (Millions)	RPM'S (Millions)		ENPLANEMENTS (Millions)	RPM'S (Millions)
1986	6.537	1,089.0	1989	4.072	861.2
1987	4.100	683.6	1990E	4.426	950.5
1988	3.117	583.3			

- o Table 19 - Includes the duplicated traffic listed above for those air carriers and commuters/regionals reporting on both RSPA Forms 41 and 298-C.

  - Forecasts and historical data exclude Alaska and foreign territory traffic.

  - The forecasts exclude the following carriers because of the predominance of jet aircraft in their fleets : Altair (beginning in 1982), Empire (1985), and Air Wisconsin (1987).

- Table 20 - Includes only aircraft with 60 seats or less. Aircraft also included with general aviation fleet shown in Tables 21 and 22.

- Table 26 - Includes the rotorcraft fleet and hours flown shown in Tables 21 and 23.

TABLE 1

U.S. SHORT-TERM ECONOMIC FORECASTS

ECONOMIC VARIABLE	FISCAL YEAR 1991				FISCAL YEAR 1992			
	1ST. QTR.	2ND. QTR.	3RD QTR.	4TH QTR.	1ST QTR.	2ND QTR.	3RD QTR.	4TH QTR.
REAL GNP (1982 $)								
DRI/McGRAW-HILL	4,154.1	4,131.8	4,127.6	4,156.1	4,187.8	4,233.8	4,273.9	4,303.7
EVANS ECONOMETkICS	4,148.7	4,128.0	4,140.5	4,167.2	4,195.6	4,220.3	4,244.6	4,261.8
THE WEFA GROUP	4,145.4	4,135.9	4,159.9	4,201.7	4,236.3	4,263.9	4,288.3	4,317.4
OMB	4,134.1	4,120.6	4,123.7	4,144.2	4,172.9	4,211.0	4,248.4	4,286.1
OIL AND GAS DEFLATOR (1982 EQUALS 100)								
DRI/McGRAW-HILL	117.0	117.4	115.2	111.8	107.3	103.3	102.2	103.4
EVANS ECONOMETRICS	114.9	112.7	108.9	110.5	111.7	112.3	113.9	115.3
THE WEFA GROUP	114.4	107.6	101.6	99.1	96.9	96.6	97.6	99.5
OMB	128.8	115.9	107.3	94.5	85.9	77.3	77.3	79.4
CONSUMER PRICE INDEX (1982-84 EQUALS 100)								
DRI/McGRAW-HILL	134.0	135.6	136.9	138.0	139.0	140.0	141.0	142.2
EVANS ECONOMETRICS	133.7	135.0	136.1	137.6	139.1	140.8	142.5	144.3
THE WEFA GROUP	133.5	134.7	135.7	136.5	137.5	138.5	139.6	141.1
OMB	132.2	133.5	135.1	136.7	137.9	138.9	140.5	142.1

Source: DRI/McGraw-Hill, Inc., November, 1990; Evans Econometrics, December, 1990; The WEFA Group, January 1991; and OMB, December 1990.

TABLE 2

U.S. LONG-TERM ECONOMIC FORECASTS

OMB (1991-1996) AND CONSENSUS (1997-2002)

FISCAL YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)	CONSUMER PRICE INDEX (1982-84 = 100)	OIL AND GAS DEFLATOR (1982 = 100)
Historical			
1986	3,693.1	109.2	82.4
1987	3,799.9	111.2	75.8
1988	3,991.0	115.7	79.4
1989	4,099.2	121.2	85.0
1990E	4,152.2	127.1	91.5
Forecast			
1991	4,130.7	134.4	111.6
1992	4,229.6	139.8	80.0
1993	4,377.9	145.1	82.9
1994	4,524.2	150.3	86.1
1995	4,664.7	155.5	89.1
1996	4,804.6	160.7	92.6
1997	4,927.5	169.0	99.3
1998	5,048.3	177.9	106.7
1999	5,166.7	187.7	114.7
2000	5,290.7	198.1	123.9
200i	5,418.6	209.0	133.7
2002	5,548.9	220.6	144.3

Source: 1991-1996; Office of Management and Budget, November 1990

1997-2002; Consensus forecast based on average growth rates of DRI, Evans, and WEFA forecasts (See Table 3), adjusted to fiscal year basis.

TABLE 3

ALTERNATIVE U.S. LONG-TERM ECONOMIC FORECASTS

CALENDAR YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)			CONSUMER PRICE INDEX (1982-84 = 100)			FUEL PRICE INDEX (1982 = 100)		
	DRI	EVANS	WEFA	DRI	EVANS	WEFA	DRI	EVANS	WEFA
Historical									
1986	3,721.7	3,71[illegible].9	3,721.7	109.6	109.6	109.6	75.3	75.3	75.3
1987	3,847.0	3,845.3	3,847.0	113.6	113.6	113.6	79.5	78.7	79.4
1988	4,016.8	4,016.9	4,016.8	118.2	118.2	118.4	79.1	79.3	79.4
1989	4,117.7	4,117.7	4,117.7	124.0	124.0	124.0	86.7	86.7	86.7
1990E	4,158.7	4,156.1	4,158.8	130.9	131.1	130.8	100.4	97.0	99.8
Forecast									
1991	4,184.3	4,154.7	4,185.6	137.9	140.4	137.4	117.7	107.5	116.4
1992	4,300.6	4,189.9	4,296.9	142.8	148.0	142.0	109.9	108.7	106.3
1993	4,394.7	4,292.6	4,411.8	147.7	156.4	147.9	110.8	115.0	106.8
1994	4,514.0	4,399.5	4,548.2	153.0	165.5	155.1	116.9	122.5	116.3
1995	4,624.0	4,506.9	4,690.6	159.2	175.4	162.8	126.7	130.5	124.3
1996	4,727.0	4,629.6	4,821.6	165.8	186.1	170.6	134.1	139.1	133.7
1997	4,830.0	4,761.1	4,948.6	173.0	197.8	178.8	143.1	148.2	145.6
1998	4,940.0	4,874.5	5,076.9	180.8	210.8	187.4	153.1	157.9	158.8
1999	5,066.0	4,967.4	5,203.5	189.2	225.4	196.4	164.4	168.2	172.4
2000	5,191.0	5,086.6*	5,329.3	198.6	240.3*	205.9	181.0	179.2*	186.4
2001	5,319.1*	5,208.7*	5,455.9	208.5*	256.1*	215.8	199.3*	190.9*	199.1
2002	5,450.3*	5,333.7*	5,583.2	218.8*	273.0*	226.1	219.4*	203.3*	213.0

Source: DRI/McGraw-Hill, Fall, 1990; Evans Economics, Inc., November 1990; and The WEFA Group, 4th Quarter 1990

* Extrapolated to 2002 for forecast purposes

TABLE 4

INTERNATIONAL GDP FORECASTS

CALENDAR YEAR	GROSS DOMESTIC PRODUCT (In Billions of 1980 U.S. Dollars) EUROPE/ AFRICA/ MIDDLE EAST	LATIN AMERICA	JAPAN/ PACIFIC BASIN/ AUSTRALIA/N. ZEALAND	WORLD
Historical*				
1986	5,043.9	1,005.2	1,944.7	13,761.6
1987	5,193.8	1,017.2	2,050.7	14,224.5
1988	5,368.9	1,034.6	2,184.9	14,825.6
1989	5,575.6	1,045.8	2,298.3	15,280.9
1990E	5,854.0	1,040.5	2,417.2	15,647.6
Forecast				
1991	6,010.3	1,077.3	2,537.0	16,009.8
1992	6,187.5	1,122.6	2,646.7	16,453.4
1993	6,399.7	1,177.3	2,792.5	16,982.7
1994	6,612.1	1,226.7	2,934.1	17,538.0
1995	6,834.8	1,280.1	3,069.0	18,128.0
1996	7,050.6	1,307.1	3,204.0	18,723.4
1997	7,290.4	1,349.4	3,335.7	19,337.8
1998	7,531.8	1,391.5	3,474.9	19,965.1
1999	7,785.1	1,458.2	3,627.5	20,630.5
2000	8,031.2	1,512.2	3,775.6	21,317.0
2001	8,284.5	1,568.2	3,928.9	22,020.5
2002	8,546.6	1,626.2	4,088.9	22,747.1

Source: The WEFA Group, World Economic Outlook, October 1990

TABLE 5

INTERNATIONAL EXCHANGE RATE FORECASTS

CALENDAR YEAR	FOREIGN EXCHANGE RATES (US$/Local Currency, End of Year) UNITED KINGDOM	WEST/UNITED GERMANY	JAPAN	UNITED STATES EFFECTIVE EXCHANGE RATE (1980 EQUALS 100)
Historical*				
1986	1.474	.515	6.285	122.0
1987	1.871	.632	8.097	107.7
1988	1.809	.562	7.946	101.7
1989	1.605	.589	6.971	106.1
1990E	1.914	.658	7.246	99.8
Forecast				
1991	1.942	.676	7.576	94.5
1992	1.960	.690	7.843	93.5
1993	1.968	.699	8.333	92.4
1994	1.976	.709	8.772	91.4
1995	2.003	.725	9.174	90.2
1996	2.006	.731	9.263	89.3
1997	2.010	.738	9.352	89.1
1998	2.028	.745	9.444	88.8
1999	2.048	.752	9.538	88.3
2000	2.017	.741	9.633	88.5
2001	1.988	.730	9.444	89.5
2002	1.959	.719	9.263	90.7

Source: The WEFA Group, World Economic Outlook, October 1990

TABLE 6

BASELINE AIR CARRIER FORECAST ASSUMPTIONS

TOTAL SYSTEM OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE FY 1990 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84$ (Cents)
Historical*						
1986	167.4	874.8	11.02	12.82	64.6	59.2
1987	166.6	894.8	10.93	12.49	52.0	46.2
1988	168.4	927.8	11.81	12.99	56.2	48.6
1989	168.8	948.4	12.43	13.04	56.4	46.1
1990E	169.0	976.1	12.60	12.60	67.6	53.2
Forecast						
1991	172	987	13.59	12.87	82.5	61.4
1992	173	999	13.93	12.75	59.1	42.3
1993	175	1,005	14.32	12.62	61.3	42.2
1994	178	1,013	14.82	12.47	63.6	42.3
1995	182	1,020	15.39	12.34	65.8	42.3
1996	185	1,027	15.98	12.22	68.4	42.6
1997	188	1,033	16.61	12.12	73.4	43.4
1998	191	1,040	17.26	12.02	78.9	44.3
1999	194	1,045	17.96	11.93	84.8	45.2
2000	198	1,050	18.69	11.84	91.6	46.2
2001	202	1,056	19.44	11.76	98.8	47.3
2002	205	1,061	20.24	11.68	106.6	48.3

* Source: RSPA, Form 41

TABLE 7

BASELINE AIR CARRIER FORECAST ASSUMPTIONS

DOMESTIC OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE FY 1990 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1986	153.0	764.1	11.33	13.18	63.5	58.2
1987	152.5	775.4	11.20	12.80	50.8	45.7
1988	153.0	785.9	12.23	13.44	55.1	47.6
1989	152.0	790.2	13.07	13.71	55.4	45.4
1990E	151.7	799.7	13.25	13.25	66.8	52.5
Forecast						
1991	154	800	14.31	13.55	81.4	60.6
1992	154	802	14.74	13.50	58.4	41.7
1993	156	804	15.18	13.37	60.5	41.7
1994	159	807	15.71	13.21	62.8	41.8
1995	162	810	16.33	13.09	65.0	41.8
1996	165	813	16.96	12.97	67.6	42.0
1997	168	816	17.66	12.89	72.4	42.9
1998	171	819	18.38	12.79	77.8	43.8
1999	174	821	19.15	12.72	83.7	44.6
2000	177	823	19.96	12.65	90.4	45.6
2001	181	825	20.80	12.58	97.6	46.7
2002	184	827	21.69	12.51	105.2	47.7

* Source: RSPA, Form 41

TABLE 8

BASELINE AIR CARRIER FORECAST ASSUMPTIONS

INTERNATIONAL OPERATIONS (PART 1)

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE FY 1990 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1986	291.8	2,614.6	9.61	11.17	69.1	63.1
1987	283.0	2,586.7	9.77	11.17	56.9	51.2
1988	278.9	2,644.2	10.35	11.37	60.2	52.0
1989	275.8	2,734.5	10.36	10.86	59.9	49.1
1990E	273.8	2,792.2	10.68	10.68	70.5	55.5
Forecast						
1991	273	2,796	11.60	10.99	86.0	64.0
1992	273	2,829	11.79	10.79	61.6	44.1
1993	273	2,845	12.11	10.67	63.9	44.0
1994	274	2,863	12.57	10.57	66.3	44.1
1995	275	2,880	13.07	10.48	68.6	44.1
1996	276	2,893	13.56	10.37	71.3	44.4
1997	277	2,910	14.07	10.26	76.5	45.3
1998	279	2,923	14.60	10.16	82.2	46.2
1999	282	2,936	15.16	10.07	88.4	47.1
2000	285	2,945	15.73	9.97	95.5	48.2
2001	288	2,958	16.33	9.87	103.0	49.3
2002	291	2,968	16.95	9.78	111.1	50.4

* Source: RSPA, Form 41

TABLE 9

BASELINE AIR CARRIER FORECAST ASSUMPTIONS

INTERNATIONAL OPERATIONS (PART 2)

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT			REVENUE PER PASSENGER MILE					
				ATLANTIC		LATIN AMERICA		PACIFIC	
	ATLANTIC (Seats)	LATIN AMERICA (Seats)	PACIFIC (Seats)	CURRENT $ (Cents)	FY 1990 $ (Cents)	CURRENT $ (Cents)	FY 1990 $ (Cents)	CURRENT $ (Cents)	FY 1990 $ (Cents)
Historical*									
1986	330.9	220.2	283.7	8.98	10.44	11.44	13.30	9.69	11.26
1987	319.0	217.4	282.6	8.99	10.28	11.23	12.84	10.24	11.70
1988	301.9	210.3	293.1	9.31	10.23	11.35	12.47	11.47	12.60
1989	290.3	203.6	302.9	8.97	9.41	11.59	12.15	11.74	12.31
1990E	278.6	195.6	318.6	9.56	9.56	11.99	11.19	11.55	11.55
Forecast									
1991	272	191	325	10.53	9.97	12.83	12.15	12.28	11.63
1992	268	188	330	10.53	9.64	13.18	12.07	12.53	11.47
1993	265	185	335	10.79	9.50	13.58	11.96	12.86	11.33
1994	263	182	339	11.21	9.43	14.08	11.84	13.31	11.20
1995	261	181	343	11.66	9.35	14.63	11.73	13.81	11.07
1996	260	180	346	12.09	9.25	15.20	11.62	14.31	10.94
1997	260	180	349	12.55	9.16	15.77	11.51	14.82	10.84
1998	261	181	352	13.03	9.07	16.37	11.39	15.36	10.69
1999	262	182	355	13.51	8.98	17.01	11.30	15.93	10.58
2000	264	183	358	14.03	8.89	17.66	11.19	16.51	10.46
2001	266	185	361	14.55	8.80	18.33	11.08	17.13	10.36
2002	268	187	364	15.10	8.71	19.03	10.98	17.78	10.26

* Source: RSPA, Form 41

TABLE 10

UNITED STATES COMMERCIAL AIR CARRIERS AND REGIONALS/COMMUTERS

TOTAL SCHEDULED PASSENGER TRAFFIC [1/]

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1986	404.7	24.6	429.3	297.4	64.1	361.5
1987	441.2	29.4	470.6	325.8	76.0	401.8
1988	441.2	34.3	475.5	329.9	90.5	420.4
1989	443.6	36.8	480.4	333.2	100.6	433.8
1990E	456.7	41.2	497.9	344.8	115.1	459.9
Forecast						
1991	454.5	43.3	497.8	341.8	121.0	462.8
1992	472.9	46.8	519.7	355.8	132.5	488.3
1993	496.4	49.8	546.2	373.9	141.6	515.5
1994	518.0	52.8	570.8	391.3	151.5	542.8
1995	545.8	56.5	602.3	413.4	162.7	576.1
1996	574.5	60.1	634.6	436.3	173.9	610.2
1997	601.7	63.6	665.3	457.9	185.0	642.9
1998	627.6	67.1	694.7	479.0	196.1	675.1
1999	653.7	70.5	724.2	499.4	206.9	706.3
2000	678.4	73.8	752.2	518.7	217.3	736.0
2001	708.7	77.9	786.6	542.9	230.3	773.2
2002	737.6	81.8	819.4	565.9	242.8	808.7

* Source: RSPA, Forms 41 and 298-C

1/ Sum of Table's 8 and 15 less duplicated traffic. See note on page 123.

TABLE 11

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1986	385.2	24.6	409.8	294.4	64.1	358.5
1987	415.5	29.4	444.9	322.1	76.0	398.1
1988	414.2	34.3	448.5	325.5	90.5	416.0
1989	415.6	36.8	452.4	328.4	100.6	429.0
1990E	424.0	41.2	465.2	339.1	115.1	454.2
Forecast						
1991	419.3	43.3	462.6	335.4	121.0	456.4
1992	434.9	46.8	481.7	348.8	132.5	481.3
1993	455.6	49.8	505.4	366.3	141.6	507.9
1994	474.7	52.8	527.5	383.1	151.5	534.6
1995	499.5	56.5	556.0	404.6	162.7	567.3
1996	525.0	60.1	585.1	426.8	173.9	600.7
1997	548.7	63.6	612.3	447.7	185.0	632.7
1998	571.3	67.1	638.4	467.9	196.1	664.0
1999	593.8	70.5	664.3	487.5	206.9	694.4
2000	614.8	73.8	688.6	506.0	217.3	723.3
2001	641.6	77.9	719.5	529.3	230.3	759.6
2002	666.9	81.8	748.7	551.5	242.8	794.3

* Source: RSPA, Form 41

TABLE 12

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED INTERNATIONAL PASSENGER TRAFFIC

	REVENUE PASSENGER ENPLANEMENTS (MIL)				REVENUE PASSENGER MILES (BIL)			
FISCAL YEAR	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL
Historical*								
1986	10.5	8.5	5.4	24.4	32.6	11.1	20.3	64.0
1987	12.4	10.4	6.6	29.4	38.5	13.0	24.5	76.0
1988	14.6	11.5	8.2	34.3	46.1	14.2	30.2	90.5
1989	15.0	11.8	10.0	36.8	49.1	14.7	36.8	100.6
1990E	16.1	12.9	12.2	41.2	53.7	16.0	45.4	115.1
Forecast								
1991	15.6	13.9	13.8	43.3	52.4	17.2	51.4	121.0
1992	16.4	14.6	15.8	46.8	55.1	18.2	59.2	132.5
1993	17.2	15.4	17.2	49.8	57.9	19.2	64.5	141.6
1994	17.9	16.1	18.8	52.8	60.7	20.2	70.6	151.5
1995	19.0	17.0	20.5	56.5	64.4	21.3	77.0	162.7
1996	20.0	17.9	22.2	60.1	67.9	22.5	83.5	173.9
1997	20.9	18.7	24.0	63.6	71.2	23.5	90.3	185.0
1998	21.8	19.5	25.8	67.1	74.4	24.6	97.1	196.1
1999	22.7	20.3	27.5	70.5	77.6	25.6	103.7	206.9
2000	23.6	21.1	29.1	73.8	80.7	26.7	109.9	217.3
2001	24.8	22.0	31.1	77.9	84.8	27.9	117.6	230.3
2002	25.9	22.9	33.0	81.8	88.8	29.1	124.9	242.8

* Source: RSPA, Form 41

TABLE 13

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER CAPACITY, TRAFFIC AND LOAD FACTORS

	DOMESTIC			INTERNATIONAL		
FISCAL YEAR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR
Historical*						
1986	488.4	294.4	60.3	108.3	64.1	59.2
1987	521.9	322.1	61.7	117.5	76.0	64.7
1988	533.3	325.5	61.0	135.4	90.5	66.9
1989	529.5	328.4	62.0	151.1	100.6	66.6
1990E	557.3	339.1	60.8	166.3	115.1	69.2
Forecast						
1991	576.9	335.4	58.1	180.2	121.0	67.1
1992	600.0	348.8	58.1	197.2	132.5	67.2
1993	625.8	366.3	58.5	213.3	141.6	66.4
1994	653.6	383.1	58.6	229.2	151.5	66.1
1995	683.0	404.6	59.2	243.9	162.7	66.7
1996	713.8	426.8	59.8	259.1	173.9	67.1
1997	744.5	447.7	60.1	274.4	185.0	67.4
1998	776.5	467.9	60.3	290.0	196.1	67.6
1999	809.1	487.5	60.3	306.1	206.9	67.6
2000	842.3	506.0	60.1	322.8	217.3	67.3
2001	876.0	529.3	60.4	340.2	230.3	67.7
2002	911.0	551.5	60.5	358.6	242.8	67.7

* Source: RSPA, Form 41

TABLE 14

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER CAPACITY, TRAFFIC AND LOAD FACTORS BY INTERNATIONAL TRAVEL REGIONS

	ATLANTIC			LATIN AMERICA			PACIFIC		
FISCAL YEAR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR
Historical*									
1986	58.2	32.6	56.0	18.4	11.1	60.2	31.5	20.3	64.4
1987	59.0	38.5	65.3	21.9	13.0	59.3	36.6	24.5	67.0
1988	70.1	46.1	65.8	22.7	14.2	62.5	42.5	30.2	71.0
1989	74.8	49.1	65.7	23.7	14.7	61.9	52.6	36.8	70.1
1990E	77.0	53.7	69.8	25.7	16.0	62.0	63.6	45.4	71.4
Forecast									
1991	78.9	52.4	66.4	27.9	17.2	61.6	73.4	51.4	70.0
1992	83.2	55.1	66.2	29.6	18.2	61.5	84.4	59.2	70.1
1993	87.8	57.9	65.9	31.3	19.2	61.3	94.2	64.5	68.5
1994	92.3	60.7	65.8	32.9	20.2	61.4	104.0	70.6	67.9
1995	96.7	64.4	66.6	34.4	21.3	61.9	112.8	77.0	68.3
1996	101.3	67.9	67.0	35.9	22.5	62.7	121.9	83.5	68.5
1997	106.0	71.2	67.2	37.4	23.5	62.8	131.0	90.3	68.9
1998	110.8	74.4	67.1	39.0	24.6	63.1	140.2	97.1	69.3
1999	115.8	77.6	67.0	40.7	25.6	62.9	149.6	103.7	69.3
2000	121.0	80.7	66.7	42.4	26.7	63.0	159.4	109.9	68.9
2001	126.2	84.8	67.2	44.3	27.9	63.0	169.7	117.6	69.3
2002	131.6	88.8	67.5	46.2	29.1	63.0	180.8	124.9	69.1

* Source: RSPA, Form 41

TABLE 15

UNITED STATES COMMERCIAL AIR CARRIERS

LARGE JET AIRCRAFT

AS OF JANUARY 1	NARROW BODY			WIDE BODY			TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	
Historical*							
1986	1,238	1,195	171	111	293	160	3,168
1987	1,460	1,160	193	130	298	160	3,401
1988	1,578	1,135	221	153	296	159	3,542
1989	1,764	1,191	257	187	300	171	3,870
1990E	1,911	1,185	257	197	283	184	4,017
Forecast							
1991	2,065	1,119	197	210	293	195	4,079
1992	2,259	1,105	173	235	305	195	4,272
1993	2,459	1,051	168	256	321	199	4,454
1994	2,701	1,002	168	269	329	204	4,673
1995	2,929	961	166	302	331	215	4,904
1996	3,130	906	166	347	33?	226	5,108
1997	3,251	842	160	371	334	248	5,206
1998	3,381	750	142	391	335	260	5,249
1999	3,474	644	117	432	336	274	5,277
2000	3,595	545	101	475	348	281	5,345
2001	3,724	445	92	528	359	285	5,433
2002	3,767	429	87	568	368	289	5,508

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 16

UNITED STATES COMMERCIAL AIR CARRIERS

TOTAL AIRBORNE HOURS

(In Thousands)

	NARROW BODY			WIDE BODY			
FISCAL YEAR	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	TOTAL
Historical*							
1986	3,644	2,985	323	381	890	551	8,774
1987	4,051	2,968	412	458	943	565	9,397
1988	4,392	2,884	439	557	957	613	9,842
1989	4,656	2,678	532	655	941	635	10,097
1990E	4,778	2,770	441	676	882	657	10,204
Forecast							
1991	5,226	2,583	336	718	915	701	10,479
1992	5,717	2,529	291	794	952	702	10,985
1993	6,212	2,392	280	864	1,000	714	11,462
1994	6,789	2,222	279	909	1,017	734	11,950
1995	7,370	2,073	275	1,025	1,016	775	12,534
1996	7,884	1,907	274	1,175	1,014	819	13,073
1997	8,142	1,723	260	1,257	1,002	904	13,288
1998	8,531	1,465	230	1,320	987	951	13,484
1999	8,850	1,174	196	1,460	974	1,004	13,658
2000	9,221	912	171	1,611	1,005	1,031	13,951
2001	9,583	656	157	1,796	1,033	1,051	14,276
2002	9,780	607	150	1,935	1,057	1,058	14,587

* Source: RSPA, Form 41

TABLE 17

TOTAL JET FUEL AND AVIATION GASOLINE FUEL CONSUMPTION

UNITED STATES CIVIL AVIATION AIRCRAFT

(In Millions of Gallons)

FISCAL YEAR	JET FUEL					AVIATION GASOLINE			TOTAL FUEL CONSUMED
	U.S. AIR CARRIERS			GENERAL AVIATION	TOTAL	AIR CARRIER	GENERAL AVIATION	TOTAL	
	DOMESTIC	INT'L.	TOTAL						
Historical*									
1986	10,733	2,525	13,258	738	13,996	5	411	416	14,412
1987	11,487	2,765	14,252	662	14,914	4	395	399	15,313
1988	11,902	3,192	15,094	654	15,748	4	394	398	16,146
1989	12,087	3,537	15,624	799	16,423	3	394	397	16,820
1990E	12,439	3,812	16,251	843	17,094	3	398	401	17,495
Forecast									
1991	12,680	4,070	16,750	889	17,639	2	399	401	18,040
1992	12,980	4,380	17,360	932	18,292	2	400	402	18,694
1993	13,370	4,660	18,030	980	19,010	2	401	403	19,413
1994	13,760	4,910	18,670	1,007	19,677	2	403	405	20,082
1995	13,940	5,110	19,050	1,055	20,105	2	407	409	20,514
1996	14,220	5,330	19,550	1,098	20,648	2	408	410	21,058
1997	14,460	5,530	19,990	1,151	21,141	2	411	413	21,554
1998	14,490	5,720	20,210	1,195	21,405	2	409	411	21,816
1999	15,010	5,900	20,910	1,235	22,145	2	411	413	22,558
2000	15,260	6,090	21,350	1,275	22,625	2	415	417	23,042
2001	15,530	6,270	21,800	1,319	23,119	2	416	418	23,537
2002	15,790	6,470	22,260	1,350	23,610	2	417	419	24,029

* Source: Air carrier jet fuel, RSPA Form 41; All others, FAA APO estimates

TABLE 18

BASELINE REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH 48 STATES (Miles)	AVERAGE PASSENGER TRIP LENGTH HA/P.R./V.I. (Miles)	AVERAGE PASSENGER LOAD FACTOR (Percent)
Historical*				
1986	20.2	158.9	99.1	45.6
1987	19.7	161.2	97.6	46.0
1988	19.2	171.6	84.3	46.6
1989	20.4	179.3	89.8	47.8
1990E	20.8	186.6	83.7	47.4
Forecast				
1991	21.9	191.0	77.0	47.4
1992	23.1	194.0	78.0	47.2
1993	24.3	196.0	78.0	47.3
1994	25.5	198.0	79.0	47.3
1995	26.9	200.0	79.0	47.3
1996	28.3	202.0	80.0	47.4
1997	29.5	204.0	80.0	47.7
1998	30.7	206.0	80.0	47.9
1999	31.8	208.0	80.0	48.1
2000	32.6	210.0	80.0	48.3
2001	33.4	212.0	80.0	48.5
2002	34.3	214.0	80.0	48.7

* Source: RSPA, Form's 298-C and 41

TABLE 19

UNITED STATES REGIONALS/COMMUTERS

SCHEDULED PASSENGER TRAFFIC

(In Millions)

	REVENUE PASSENGER ENPLANEMENTS			REVENUE PASSENGER MILES		
FISCAL YEAR	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL
Historical*						
1986	23.3	2.7	26.0	3,769.0	267.7	4,036.7
1987	25.6	2.4	28.0	4,127.2	234.2	4,361.4
1988	28.4	1.7	30.1	4,875.3	152.6	5,027.9
1989	30.7	1.4	32.1	5,504.8	125.3	5,630.1
1990E	35.4	1.7	37.1	6,605.6	142.3	6,747.9
Forecast						
1991	37.7	2.0	39.7	7,200.7	162.0	7,362.7
1992	40.5	2.2	42.7	7,857.0	176.0	8,033.0
1993	43.3	2.5	45.8	8,486.8	197.5	8,684.3
1994	45.9	2.7	48.6	9,088.2	216.0	9,304.2
1995	48.9	3.0	51.9	9,780.0	240.0	10,020.0
1996	52.2	3.2	55.4	10,544.4	259.2	10,803.6
1997	55.7	3.5	59.2	11,362.8	283.5	11,646.3
1998	59.2	3.7	62.9	12,195.2	299.7	12,494.9
1999	62.9	3.9	66.8	13,083.2	315.9	13,399.1
2000	66.7	4.1	70.8	14,007.0	332.1	14,339.1
2001	70.4	4.3	74.7	14,924.8	348.3	15,273.1
2002	74.1	4.5	78.6	15,857.4	364.5	16,221.9

* Source: RSPA, Form's 298-C and 41

TABLE 20

UNITED STATES REGIONALS/COMMUTERS

PASSENGER AIRCRAFT

AS OF JANUARY 1	LESS THAN 15 SEATS	15 TO 19 SEATS	20 TO 40 SEATS	MORE THAN 40 SEATS	TOTAL
Historical*					
1986	564	615	200	159	1,538
1987	581	652	213	158	1,604
1988	573	740	251	120	1,684
1989	538	802	303	139	1,782
1990E	541	762	366	150	1,819
Forecast					
1991	502	786	402	170	1,860
1992	470	809	441	205	1,925
1993	434	824	476	257	1,991
1994	392	830	520	299	2,041
1995	355	820	560	346	2,081
1996	299	818	600	393	2,110
1997	250	796	645	439	2,130
1998	221	769	679	486	2,155
1999	200	750	709	518	2,177
2000	187	733	747	546	2,213
2001	173	702	788	588	2,251
2002	155	671	812	626	2,264

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 21

ACTIVE GENERAL AVIATION AIRCRAFT
(In Thousands)

AS OF JANUARY 1	FIXED WING				ROTORCRAFT			
	PISTON							
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1986	164.4	23.8	5.4	4.4	2.9	3.5	6.3	210.7
1987	171.8	23.9	6.0	4.5	2.9	4.0	7.0	220.0
1988	171.0	23.4	5.3	4.4	2.8	3.5	6.8	217.2
1989	164.8	22.8	5.3	4.2	2.6	3.8	6.9	210.3
1990E	170.4	23.4	6.3	4.4	3.2	4.2	7.7	219.7
Forecast								
1991	172.9	23.7	6.6	4.7	3.4	4.6	8.0	223.9
1992	174.1	23.5	6.8	4.9	3.3	4.9	8.3	225.8
1993	174.1	23.4	6.9	5.1	3.2	5.2	8.6	226.5
1994	173.4	23.3	7.0	5.4	3.1	5.6	8.9	226.7
1995	172.9	23.3	7.1	5.7	3.0	6.1	9.2	227.3
1996	172.4	23.4	7.2	6.0	3.0	6.3	9.5	227.8
1997	171.9	23.5	7.5	6.2	3.0	6.6	9.8	228.5
1998	171.6	23.6	7.6	6.4	2.9	7.0	9.9	229.0
1999	171.4	23.7	7.7	6.6	2.8	7.4	10.1	229.7
2000	171.1	23.8	7.8	6.8	2.8	7.8	10.2	230.3
2001	170.8	23.9	7.9	7.0	2.7	8.2	10.4	230.9
2002	170.5	24.0	8.0	7.2	2.6	8.6	10.6	231.5

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.
An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

TABLE 22

ACTIVE GENERAL AVIATION AIRCRAFT

BY FAA REGION

(In Thousands)

AS OF JANUARY 1	FAA REGION ANE	AEA	ASO	AGL	ACE	ASW	AWP	ANM	AAL	TOTAL
Historical*										
1986	8.0	22.7	32.8	37.5	12.4	32.7	36.9	21.2	6.5	210.7
1987	9.0	25.5	33.5	37.8	13.1	32.7	38.8	22.0	7.6	220.0
1988	9.1	24.1	34.8	38.6	13.2	30.5	38.0	21.2	7.6	217.1
1989	9.6	23.9	34.6	37.4	12.2	29.5	36.8	19.9	6.3	210.3
1990E	9.4	25.2	36.9	39.4	11.9	31.0	37.7	21.6	6.5	219.7
Forecast										
1991	9.4	25.8	37.7	40.2	11.8	31.6	38.3	22.4	6.7	223.9
1992	9.4	26.1	38.3	40.0	11.7	32.1	38.6	22.7	6.9	225.8
1993	9.5	26.1	38.6	39.7	11.6	32.3	38.8	22.9	7.0	226.5
1994	9.5	26.1	38.8	39.4	11.5	32.4	38.9	23.0	7.1	226.7
1995	9.5	26.4	38.9	39.2	11.4	32.5	39.1	23.1	7.2	227.3
1996	9.6	26.4	39.0	39.2	11.4	32.6	39.2	23.2	7.2	227.8
1997	9.6	26.5	39.2	39.2	11.4	32.8	39.3	23.3	7.2	228.5
1998	9.7	26.5	39.3	39.2	11.4	32.9	39.4	23.4	7.2	229.0
1999	9.7	26.5	39.4	39.3	11.5	33.0	39.5	23.5	7.3	229.7
2000	9.8	26.6	39.5	39.3	11.5	33.1	39.6	23.6	7.3	230.3
2001	9.8	26.6	39.7	39.3	11.6	33.2	39.7	23.7	7.3	230.9
2002	9.8	26.6	39.9	39.3	11.6	33.4	39.8	23.8	7.3	231.5

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

TABLE 23

GENERAL AVIATION HOURS FLOWN
(In Millions)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1986	22.2	4.9	2.7	1.7	0.8	1.8	0.4	34.5
1987	22.3	4.9	2.2	1.6	0.6	1.6	0.4	33.6
1988	22.0	4.4	2.3	1.6	0.6	2.0	0.6	33.6
1989	22.2	4.6	2.9	1.7	0.7	2.1	0.5	34.7
1990E	22.4	4.6	3.3	1.7	0.8	2.1	0.5	35.4
Forecast								
1991	22.5	4.6	3.5	1.8	0.8	2.1	0.5	35.8
1992	22.6	4.6	3.6	1.9	0.8	2.3	0.5	36.3
1993	22.7	4.6	3.7	2.0	0.8	2.6	0.5	36.9
1994	22.8	4.6	3.7	2.1	0.9	2.6	0.5	37.2
1995	22.8	4.7	3.8	2.2	0.9	2.9	0.6	37.9
1996	22.9	4.7	3.9	2.3	0.9	3.1	0.8	38.6
1997	22.9	4.8	4.1	2.4	0.9	3.3	0.8	39.2
1998	23.0	4.8	4.2	2.5	0.7	3.5	1.0	39.7
1999	23.1	4.8	4.3	2.6	0.7	3.6	1.0	40.1
2000	23.2	4.9	4.4	2.7	0.7	3.7	1.0	40.6
2001	23.3	4.9	4.5	2.8	0.7	3.9	1.0	41.1
2002	23.4	4.9	4.5	2.9	0.7	4.0	1.2	41.6

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

TABLE 24

ACTIVE PILOTS BY TYPE OF CERTIFICATE
(In Thousands)

AS OF JANUARY 1	STUDENTS	PRIVATE	COMMERCIAL	AIRLINE TRANSPORT	HELICOPTER	GLIDER	LIGHTER-THAN-AIR	TOTAL	INSTRUMENT RATED 1/
Historical*									
1986	146.7	311.1	151.6	82.7	8.1	8.2	1.1	709.5	258.6
1987	150.3	305.7	147.8	87.2	8.6	8.4	1.1	709.1	262.4
1988	146.0	300.9	143.6	91.3	8.7	7.9	1.2	699.7	266.1
1989	136.9	299.8	143.0	97.0	8.6	7.6	1.1	694.0	273.8
1990E	142.5	293.2	144.5	102.1	8.9	7.7	1.1	700.0	282.8
Forecast									
1991	145.4	294.1	146.6	106.9	9.1	8.1	1.1	711.3	287.9
1992	147.9	296.2	148.4	110.3	9.3	8.4	1.2	721.7	291.4
1993	150.1	297.1	149.9	113.8	9.4	8.5	1.2	730.0	295.8
1994	152.0	297.7	151.4	117.4	9.5	8.6	1.2	737.8	300.2
1995	153.5	298.3	152.9	121.7	9.7	8.7	1.3	746.1	304.1
1996	154.6	299.3	154.5	126.2	9.8	8.8	1.4	754.6	307.7
1997	155.3	300.2	156.0	130.8	9.9	8.9	1.5	762.6	312.3
1998	155.9	301.1	157.6	134.3	10.0	9.0	1.6	769.5	316.4
1999	156.4	302.0	159.1	137.9	10.1	9.1	1.7	776.3	320.5
2000	156.4	303.0	160.7	141.6	10.2	9.2	1.8	782.9	323.4
2001	157.4	303.9	162.3	144.4	10.3	9.3	1.9	789.5	326.0
2002	157.9	304.8	163.9	147.3	10.4	9.4	2.0	795.7	328.0

* Source: FAA Statistical Handbook of Aviation.

1/ Instrument rated pilots should not be added to other categories in deriving total.

Notes: Detail may not add to total because of independent rounding.

TABLE 25

GENERAL AVIATION AIRCRAFT FUEL CONSUMPTION
(In Millions of Gallons)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1986	242.0	157.8	230.0	451.4	11.0	56.7	0.1	1,149.0
1987	236.5	148.5	197.3	409.4	10.1	55.4	0.1	1,057.3
1988	235.4	148.5	189.1	409.4	10.1	55.4	0.1	1,048.0
1989	239.9	144.8	265.0	462.5	8.7	71.5	0.1	1,192.5
1990E	241.9	145.8	297.3	473.6	9.8	71.8	0.1	1,240.3
Forecast								
1991	243.0	145.8	315.3	501.5	9.8	71.8	0.1	1,287.3
1992	244.1	145.8	324.4	529.3	9.8	78.7	0.1	1,332.2
1993	245.2	145.8	333.4	557.2	9.8	88.9	0.1	1,380.4
1994	246.2	145.8	333.4	585.1	11.1	88.9	0.1	1,410.6
1995	246.2	149.0	342.4	612.9	11.1	99.2	0.2	1,461.0
1996	247.3	149.0	351.4	640.8	11.1	106.0	0.2	1,505.8
1997	247.3	152.2	369.4	668.6	11.1	112.9	0.2	1,561.7
1998	248.4	152.2	378.4	696.5	8.6	119.7	0.3	1,604.1
1999	249.5	152.2	387.4	724.4	8.6	123.1	0.3	1,645.5
2000	250.6	155.3	396.4	752.2	8.6	126.5	0.3	1,689.9
2001	251.6	155.3	405.5	780.1	8.6	133.4	0.3	1,734.8
2002	252.7	155.3	405.5	807.9	8.6	136.8	0.3	1,767.1

* Source: FAA APO Estimates

TABLE 26

ACTIVE ROTORCRAFT FLEET AND HOURS FLOWN

AS OF JANUARY 1	ACTIVE FLEET (Thousands) PISTON	TURBINE	TOTAL	HOURS FLOWN (1) (Millions) PISTON	TURBINE	TOTAL
Historical*						
1986	2.9	3.5	6.4	0.8	1.8	2.6
1987	2.9	4.0	6.9	0.6	1.6	2.3
1988	2.8	3.5	6.3	0.6	2.0	2.6
1989	2.6	3.8	6.4	0.7	2.1	2.8
1990E	3.2	4.2	7.4	0.8	2.1	2.9
Forecast						
1991	3.4	4.6	8.0	0.8	2.1	2.9
1992	3.3	4.9	8.2	0.8	2.3	3.1
1993	3.2	5.2	8.4	0.8	2.6	3.4
1994	3.1	5.6	8.7	0.9	2.6	3.5
1995	3.0	6.1	9.1	0.9	2.9	3.8
1996	3.0	6.3	9.3	0.9	3.1	4.0
1997	3.0	6.6	9.6	0.9	3.3	4.2
1998	2.9	7.0	9.9	0.7	3.5	4.2
1999	2.8	7.4	10.2	0.7	3.6	4.3
2000	2.8	7.8	10.6	0.7	3.7	4.4
2001	2.7	8.2	10.9	0.7	3.9	4.6
2002	2.6	8.6	11.2	0.7	4.0	4.7

* Source: FAA Statistical Handbook of Aviation

(1) Helicopter hours flown are on a fiscal year basis.

TABLE 27

TOTAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	NUMBER OF FAA TOWERS
Historical*						
1986	12.3	6.9	37.1	2.6	59.0	399
1987	13.1	7.3	37.8	2.7	61.0	399
1988	12.8	8.3	37.5	2.8	61.3	399
1989	12.5	8.3	37.8	2.8	61.4	399
1990E	12.9	8.8	39.0	2.8	63.5	403
Forecast						
1991	13.2	9.2	39.4	2.8	64.6	403
1992	13.5	9.6	40.0	2.8	65.9	403
1993	13.9	10.0	40.6	2.8	67.3	403
1994	14.3	10.4	41.4	2.8	68.9	403
1995	14.8	10.8	42.3	2.8	70.7	403
1996	15.2	11.2	43.3	2.8	72.5	403
1997	15.6	11.5	44.2	2.8	74.1	403
1998	15.9	11.8	45.0	2.8	75.5	403
1999	16.2	12.0	45.8	2.8	76.8	403
2000	16.5	12.2	46.5	2.8	78.0	403
2001	16.8	12.5	47.4	2.8	79.5	403
2002	17.1	12.8	48.2	2.8	80.9	403

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 28

ITINERANT AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1986	12.3	6.9	21.9	1.4	42.5
1987	13.1	7.3	22.1	1.4	43.9
1988	12.8	8.3	22.1	1.4	44.5
1989	12.5	8.3	22.1	1.4	44.3
1990E	12.9	8.8	22.4	1.4	45.5
Forecast					
1991	13.2	9.2	22.6	1.4	46.4
1992	13.5	9.6	23.0	1.4	47.5
1993	13.9	10.0	23.4	1.4	48.7
1994	14.3	10.4	23.9	1.4	50.0
1995	14.8	10.8	24.5	1.4	51.5
1996	15.2	11.2	25.1	1.4	52.9
1997	15.6	11.5	25.6	1.4	54.1
1998	15.9	11.8	26.1	1.4	55.2
1999	16.2	12.0	26.6	1.4	56.2
2000	16.5	12.2	27.0	1.4	57.1
2001	16.8	12.5	27.5	1.4	58.2
2002	17.1	12.8	28.0	1.4	59.3

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 29

LOCAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1986	15.2	1.3	16.4
1987	15.8	1.3	17.1
1988	15.4	1.4	16.8
1989	15.7	1.4	17.1
1990	16.6	1.4	18.0
Forecast			
1991	16.8	1.4	18.2
1992	17.0	1.4	18.4
1993	17.2	1.4	18.6
1994	17.5	1.4	18.9
1995	17.8	1.4	19.2
1996	18.2	1.4	19.6
1997	18.6	1.4	20.0
1998	18.9	1.4	20.3
1999	19.2	1.4	20.6
2000	19.5	1.4	20.9
2001	19.9	1.4	21.3
2002	20.2	1.4	21.6

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 30

INSTRUMENT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	
Historical*						
1986	12.8	6.6	16.8	4.3	40.5	(8.4)
1987	13.7	7.3	17.9	4.4	43.4	(9.2)
1988	13.4	8.4	18.3	4.4	44.5	(9.5)
1989	13.6	8.4	18.6	4.5	45.0	(9.4)
1990E	14.0	9.4	19.1	4.4	46.8	(10.0)
Forecast						
1991	14.3	9.8	19.3	4.4	47.8	(10.2)
1992	14.6	10.2	19.7	4.4	48.9	(10.5)
1993	15.0	10.6	20.1	4.4	50.1	(10.5)
1994	15.4	11.0	20.6	4.4	51.4	(10.5)
1995	15.9	11.4	21.2	4.4	52.9	(10.5)
1996	16.4	11.8	21.8	4.4	54.4	(10.5)
1997	16.8	12.1	22.3	4.4	55.6	(10.5)
1998	17.2	12.4	22.9	4.4	56.9	(10.5)
1999	17.6	12.6	23.3	4.4	57.9	(10.5)
2000	17.9	12.8	23.8	4.4	58.9	(10.5)
2001	18.2	13.1	24.4	4.4	60.1	(10.5)
2002	18.6	13.4	25.0	4.4	61.4	(10.5)

* Source: FAA Air Traffic Activity.

Notes: Non-IFR instrument counts at Terminal Control Area (TCA) facilities and expanded area radar service are included in the totals and are shown in parenthesis (See Table 31). The data include instrument operations at FAA operated military radar approach control facilities.

Detail may not add because of rounding.

TABLE 31

NON-IFR INSTRUMENT OPERATIONS
(In Millions)

FISCAL YEAR	TERMINAL CONTROL AREAS	AIRPORT RADAR SERVICE AREAS	TOTAL
Historical*			
1986	1.7	6.7	8.4
1987	1.7	7.5	9.2
1988	1.7	7.8	9.5
1989	1.6	7.8	9.4
1990E	1.9	8.1	10.0
Forecast			
1991	2.0	8.2	10.2
1992	2.1	8.4	10.5
1993	2.1	8.4	10.5
1994	2.1	8.4	10.5
1995	2.1	8.4	10.5
1996	2.1	8.4	10.5
1997	2.1	8.4	10.5
1998	2.1	8.4	10.5
1999	2.1	8.4	10.5
2000	2.1	8.4	10.5
2001	2.1	8.4	10.5
2002	2.1	8.4	10.5

* Source: FAA

TABLE 32

IFR AIRCRAFT HANDLED

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In Millions)

FISCAL YEAR	IFR AIRCRAFT HANDLED				
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1986	16.0	5.0	8.1	5.1	34.2
1987	17.1	5.3	8.1	5.3	35.8
1988	17.9	5.8	8.1	4.6	36.4
1989	17.5	5.2	8.2	5.7	36.6
1990	18.6	5.6	7.9	5.5	37.6
Forecast					
1991	19.0	5.9	8.1	5.5	38.5
1992	19.6	6.2	8.3	5.5	39.6
1993	20.2	6.4	8.5	5.5	40.6
1994	20.7	6.6	8.7	5.5	41.5
1995	21.4	6.9	8.9	5.5	42.7
1996	22.0	7.1	9.1	5.5	43.7
1997	22.5	7.3	9.3	5.5	44.6
1998	23.0	7.5	9.5	5.5	45.5
1999	23.4	7.7	9.6	5.5	46.2
2000	23.9	7.9	9.8	5.5	47.1
2001	24.4	8.1	10.0	5.5	48.0
2002	24.9	8.3	10.2	5.5	48.9

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 33

IFR DEPARTURES AND OVERS

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In Millions)

FISCAL YEAR	AIR CARRIER IFR DEPARTURES	AIR CARRIER OVERS	AIR TAXI/COMMUTER IFR DEPARTURES	AIR TAXI/COMMUTER OVERS	GENERAL AVIATION IFR DEPARTURES	GENERAL AVIATION OVERS	MILITARY IFR DEPARTURES	MILITARY OVERS	TOTAL DEPARTURES	TOTAL OVERS
Historical*										
1986	5.7	4.6	2.3	0.4	3.4	1.3	1.8	1.5	13.2	7.7
1987	6.0	5.0	2.5	0.4	3.4	1.3	1.9	1.5	13.8	8.3
1988	6.1	5.6	2.7	0.4	3.4	1.3	1.6	1.5	13.8	8.7
1989	6.0	5.4	2.5	0.3	3.4	1.4	1.9	1.9	13.8	9.0
1990	6.4	5.8	2.6	0.3	3.3	1.3	1.8	1.8	14.1	9.3
Forecast										
1991	6.5	6.0	2.8	0.3	3.4	1.3	1.8	1.9	14.5	9.5
1992	6.7	6.2	2.9	0.4	3.5	1.3	1.8	1.9	14.9	9.8
1993	6.9	6.4	3.0	0.4	3.6	1.3	1.8	1.9	15.3	10.0
1994	7.1	6.5	3.1	0.4	3.7	1.3	1.8	1.9	15.7	10.1
1995	7.4	6.6	3.2	0.5	3.8	1.3	1.8	1.9	16.2	10.3
1996	7.6	6.8	3.3	0.5	3.9	1.3	1.8	1.9	16.6	10.5
1997	7.8	6.9	3.4	0.5	4 0	1.3	1.8	1.9	17.0	10.6
1998	8.0	7.0	3.5	0.5	4.1	1.3	1.8	1.9	17.4	10.7
1999	8.2	7.0	3.6	0.5	4.1	1.4	1.8	1.9	17.7	10.8
2000	8.4	7.1	3.7	0.5	4.2	1.4	1.8	1.9	18.1	10.9
2001	8.6	7.2	3.8	0.5	4.3	1.4	1.8	1.9	18.5	11.0
2002	8.8	7.3	3.9	0.5	4.4	1.4	1.8	1.9	18.9	11.1

* Source: FAA Air Traffic Activity.

Note: Totals may not add because of rounding.

TABLE 34

TOTAL FLIGHT SERVICES

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

FISCAL YEAR	FLIGHT PLANS ORIGINATED	PILOT BRIEFS	AIRCRAFT CONTACTED	TOTAL FLIGHT SERVICES
Historical*				
1986	7.5	13.4	7.2	49.0
1987	7.6	12.8	7.0	47.7
1988	7.6	11.7	6.4	45.0
1989	7.4	12.0	6.2	45.0
1990E	7.0	11.5	6.0	43.0
Forecast				
1991	6.8	11.4	5.9	42.3
1992	7.0	11.5	5.8	42.8
1993	7.2	11.6	5.8	43.4
1994	7.3	11.6	5.9	43.7
1995	7.4	11.7	5.9	44.1
1996	7.5	11.7	5.9	44.3
1997	7.6	11.8	6.0	44.8
1998	7.7	11.8	6.0	45.0
1999	7.7	11.8	6.0	45.0
2000	7.8	11.9	6.0	45.4
2001	7.8	12.0	6.0	45.6
2002	7.9	12.0	6.0	45.8

* Source: FAA Air Traffic Activity.

Notes: Total flight services is equal to the sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted.

TABLE 35

FLIGHT PLANS ORIGINATED

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

	FLIGHT PLANS ORIGINATED		
FISCAL YEAR	IFR-DVFR	VFR	TOTAL
Historical*			
1986	5.9	1.6	7.5
1987	5.9	1.7	7.6
1988	5.8	1.7	7.6
1989	5.7	1.7	7.4
1990E	5.3	1.7	7.0
Forecast			
1991	5.2	1.6	6.8
1992	5.3	1.7	7.0
1993	5.4	1.8	7.2
1994	5.5	1.8	7.3
1995	5.6	1.8	7.4
1996	5.7	1.8	7.5
1997	5.7	1.9	7.6
1998	5.8	1.9	7.7
1999	5.8	1.9	7.7
2000	5.9	1.9	7.8
2001	5.9	1.9	7.8
2002	5.9	2.0	7.9

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 36

AIRCRAFT CONTACTED

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

	USER CATEGORY				FLIGHT RULES		
FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	IFR-DVFR	VFR	TOTAL
Historical*							
1986	0.4	1.0	5.4	0.4	2.1	5.1	7.2
1987	0.4	1.0	5.2	0.4	2.1	4.9	7.0
1988	0.3	0.9	4.8	0.4	1.9	4.6	6.4
1989	0.3	0.8	4.7	0.4	1.9	4.3	6.2
1990E	0.3	0.8	4.5	0.4	1.8	4.2	6.0
Forecast							
1991	0.3	0.8	4.4	0.4	1.8	4.1	5.9
1992	0.3	0.8	4.3	0.4	1.8	4.0	5.8
1993	0.3	0.8	4.3	0.4	1.8	4.0	5.8
1994	0.3	0.8	4.4	0.4	1.8	4.1	5.9
1995	0.3	0.8	4.4	0.4	1.8	4.1	5.9
1996	0.3	0.8	4.4	0.4	1.8	4.1	5.9
1997	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1998	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1999	0.3	0.8	4.5	0.4	1.9	4.1	6.0
2000	0.3	0.8	4.5	0.4	1.9	4.1	6.0
2001	0.3	0.8	4.5	0.4	1.9	4.1	6.0
2002	0.3	0.8	4.5	0.4	1.9	4.1	6.0

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 37

ACTIVE U.S. MILITARY AIRCRAFT

IN THE CONTINENTAL UNITED STATES [1/]

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1986	9,730	1,803	386	8,238	20,157
1987	9,819	1,865	370	8,460	20,514
1988	9,954	2,222	305	8,529	21,210
1989	9,501	2,131	261	7,330	19,223
1990E	9,220	2,062	258	7,066	18,606
Forecast					
1991	9,273	1,999	256	6,889	18,417
1992	8,960	1,937	245	6,866	18,008
1993	8,680	1,902	242	6,781	17,605
1994	8,576	1,889	241	6,544	17,250
1995	8,516	1,862	235	6,064	16,677
1996	8,510	1,833	233	6,138	16,714
1997	8,400	1,812	232	5,901	16,345
1998	8,498	1,811	232	5,903	16,444
1999	8,595	1,816	232	5,903	16,546
2000	8,638	1,816	231	5,902	16,587
2001	8,701	1,814	231	5,902	16,648
2002	8,685	1,812	231	5,902	16,630

* Source: Office of the Secretary of Defense, Department of Defense.

1/ Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

TABLE 38

ACTIVE U.S. MILITARY AIRCRAFT

HOURS FLOWN IN THE CONTINENTAL UNITED STATES [1/]

(In Thousands)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1986	3,510	820	155	1,798	6,283
1987	3,268	753	140	1,879	6,040
1988	3,339	808	92	1,763	6,002
1989	3,905	913	93	1,706	6,617
1990E	3,849	908	88	1,733	6,578
Forecast					
1991	3,304	809	85	1,702	5,900
1992	3,143	785	82	1,654	5,664
1993	3,058	778	80	1,652	5,568
1994	3,015	773	82	1,623	5,493
1995	2,996	772	82	1,481	5,331
1996	3,045	768	82	1,402	5,297
1997	3,081	758	82	1,401	5,322
1998	3,139	758	82	1,401	5,380
1999	3,201	758	82	1,398	5,439
2000	3,237	758	82	1,395	5,472
2001	3,278	758	82	1,395	5,513
2002	3,278	758	82	1,395	5,513

* Source: Office of the Secretary of Defense, Department of Defense.

[1/] Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

GLOSSARY OF TERMS

Air Carrier Operations -- Arrivals and departures of air carriers certificated in accordance with FAR Parts 121 and 127.

Air Route Traffic Control Center (ARTCC) -- A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.

Air Taxi -- An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

Air Traffic -- Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Hub -- Cities and Metropolitan Statistical Areas requiring aviation services. May include more than one airport. Communities fall into four classes as determined by the community's percentage of the total enplaned passengers by scheduled air carriers in the 50 United States, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration:

1. Large: 1.00 percent (4,296,546 passengers and over in CY 1989).
2. Medium: 0.25 percent to 0.999 percent (between 1,074,137 and 4,296,546 passengers in CY 1989).
3. Small: 0.05 percent to 0.249 percent (between 214,827 and 1,074,137 passengers in CY 1989).
4. Nonhub: Less than 0.05 percent (fewer than 214,827 passengers in CY 1988).

Air Travel Club -- An operator certificated in accordance with FAR Part 123 to engage in the carriage of members who qualify for that carriage by payment of an assessment, dues, membership fees, or other similar remittance.

Aircraft Contacted -- Aircraft with which the flight service stations have established radio communications contact. One count is made for each en route landing or departing aircraft contacted by a flight service station, regardless of the number of contacts made with an individual aircraft during the same flight. A flight contacting five FSS's would be counted as five aircraft contacted.

Aircraft Handled -- See IFR AIRCRAFT HANDLED.

Aircraft Operations -- The airborne movement of aircraft in controlled or noncontrolled airport terminal areas,

and counts at en route fixes or other points where counts can be made. There are two types of operations: local and itinerant.

1. LOCAL OPERATIONS are performed by aircraft that:

   (a) operate in the local traffic pattern or within sight of the airport;

   (b) are known to be departing for or arriving from flights in local practice areas located within a 20-mile radius of the airport;

   (c) execute simulated instrument approaches or low passes at the airport.

2. ITINERANT OPERATIONS are all aircraft operations other than local operations.

Airport Advisory Service -- A service provided by flight service stations at airports not served by a control tower. This service provides information to arriving and departing aircraft concerning wind direction/speed, favored runway, altimeter setting, pertinent-known traffic/field conditions, airport taxi routes/traffic patterns, and authorized instrument approach procedures. This information is advisory and does not constitute an ATC clearance.

Airport Traffic Control Tower -- A terminal facility that through the use of air/ground communications, visual signaling, and other devices, provides ATC services to airborne aircraft operating in the vicinity of an airport and to aircraft operating on the movement area.

All-Cargo Carrier -- An air carrier certificated in accordance with FAR Part 121 to provide scheduled air freight, express, and mail transportation over specified routes, as well as to conduct nonscheduled operations that may include passengers.

Approach Control Facility -- A terminal air traffic control facility providing approach control service.

Approach Control Service -- Air traffic control service provided by an approach control facility for arriving and departing VFR/IFR aircraft and, on occasion, for enroute aircraft. At some airports not served by an approach control facility, the ARTCC provides limited approach control service.

ARTCC -- See AIR ROUTE TRAFFIC CONTROL CENTER.

ASM's -- See AVAILABLE SEAT MILES.

Available Seat Miles (ASM's) -- The aircraft miles flown in a flight stage, multiplied by the number of seats available on that stage for revenue passenger use.

Business Transportation -- Any use of an aircraft, not for compensation or hire, by an individual for transportation required by the business in which the individual is engaged.

Center -- See AIR ROUTE TRAFFIC CONTROL CENTER.

Center Area -- The specified airspace within which an Air Route Traffic Control Center (ARTCC) provides air traffic control and advisory service.

Center Radar Approach Control (CERAP) -- A combined Air Route Traffic Control Center (ARTCC) and a Terminal Radar Approach Control facility (TRACON).

CERAP -- See CENTER RADAR APPROACH CONTROL.

Commercial Air Carriers -- An air carrier certificated in accordance with FAR Part 121 or 127 to conduct scheduled services on specified routes. These air carriers may also provide nonscheduled or charter services as a secondary operation. Four carrier groupings have been designated for statistical and financial data aggregation and analysis.

1. MAJORS: Air carriers with annual operating revenues greater than $1 billion.

2. NATIONALS: Air carriers with annual operating revenues between $100 million and $1 billion.

3. LARGE REGIONALS: Air carriers with annual operating revenues between $10 million and $99,999,999.

4. MEDIUM REGIONALS: Air carriers with annual operating revenues less than $10 million.

Common IFR Room -- A highly automated terminal radar control facility. It provides terminal radar service in an area encompassing more than one major airport that accommodates instrument flight operations.

Commuter Air Carrier -- An air carrier certificated in accordance with FAR Part 135 or 121 that operates aircraft with a maximum of 60 seats, and that provides at least five scheduled round trips per week between two or more points, or that carries mail.

Commuter/Air Taxi Operations -- Arrivals and departures of air carriers certificated in accordance with FAR Part 135.

Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

Domestic Operations -- All air carrier operations having destinations within the 50 United States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

Executive Transportation -- Any use of an aircraft, not for compensation or hire, by a corporation, company or other organization for the purpose of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft.

FAA -- Federal Aviation Administration.

Facility -- See AIR TRAFFIC CONTROL TOWER.

Flight Plan -- Prescribed information relating to the intended flight of an aircraft that is filed orally or in writing with a flight service station or an air traffic control facility.

Flight Service Station (FSS) -- Air Traffic Service facilities within the National Airspace System that provide preflight pilot briefings and en route communications with IFR flights; assist lost IFR/VFR aircraft; assist aircraft having emergencies; relay ATC clearances, originate, classify, and disseminate Notices to Airmen (NOTAM's); broadcast aviation weather and NAS information; receive and close flight plans; monitor radio NAVAIDS; notify search and rescue units of missing VFR aircraft; and operate the national weather teletypewriter systems. In addition, at selected locations, FSS's take weather observations, issue airport advisories, administer airmen written examinations, and advise Customs and Immigration of transborder

flights.

Flight Services -- See TOTAL FLIGHT SERVICES.

Foreign Flag Air Carrier -- An air carrier other than a U.S. flag air carrier in international air transportation. "Foreign air carrier" is a more inclusive term than "foreign flag air carrier," including those non-U.S. air carriers operating solely within their own domestic boundaries. In practice, the two terms are used interchangeably.

FSS -- See FLIGHT SERVICE STATION.

General Aviation -- All civil aviation activity except that of air carriers certificated in accordance with FAR Parts 121, 123, 127, and 135. The types of aircraft used in general aviation (GA) activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons, and dirigibles.

General Aviation Operations -- Arrivals and departures of all civil aircraft, except those classified as air carrier and commuter/air taxi.

Hub -- See AIR TRAFFIC HUB.

IFR -- See INSTRUMENT FLIGHT RULES.

IFR Aircraft Handled -- The number of IFR departures multiplied by two, plus the number of IFR overs. This definition assumes that the number of departures (acceptances, extensions, and originations of IFR flight plans) is equal to the number of landings (IFR flight plans closed).

IFR Departures -- An IFR departure includes IFR flights that:

1. originate in a Center's area;
2. are extended by the Center; or
3. are accepted by the Center under sole enroute clearance procedures.

IFR Overs -- An IFR flight that originates outside the ARTCC area and passes through the area without landing.

IFSS -- See INTERNATIONAL FLIGHT SERVICE STATION.

International and Territorial Operations -- The operation of aircraft flying between the 50 United States and foreign points, between the 50 United States and U.S. possessions and territories, and between two foreign points. Includes both the combination passenger/cargo and the all-cargo carriers engaged in international and territorial operations.

Instructional Flying -- Any use of aircraft for the purpose of formal instruction with the flight instructor aboard, or with the maneuvers on the particular flight(s) specified by the flight instructor.

Instrument Approach -- A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. An instrument approach is prescribed and approved for a specific airport by competent authority (FAR Part 91).

Instrument Flight Rules (IFR) -- Rules governing the procedures for conducting instrument flight.

Instrument Operation -- An aircraft operation in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided by a terminal control facility or air route traffic control center.

International Flight Service Station (IFSS) -- A central operations facility in the flight advisory system, manned and equipped to control aeronautical point-to-point telecommunications and air/ground telecommunications with pilots operating over international territory or waters, providing flight plan filing, weather information, search and rescue action, and other flight assistance operations.

Itinerant Operations -- See AIRCRAFT OPERATIONS.

Large Regionals -- See COMMERCIAL AIR CARRIERS.

Local Operations -- See AIRCRAFT OPERATIONS.

Majors -- See COMMERCIAL AIR CARRIERS.

Medium Regionals -- See COMMERCIAL AIR CARRIERS.

Military Operations -- Arrivals and departures of aircraft not classified as civil.

Nationals -- See COMMERCIAL AIR CARRIERS.

Personal/Pleasure Flying -- Any use of an aircraft for personal purposes not associated with a business or profession, and not for hire. This includes maintenance of pilot proficiency.

Pilot Briefing -- A service provided by the flight service station to assist pilots in flight planning. Briefing items may include weather information, NOTAM's, military activities, flow control information, and other items as requested.

Radar Air Traffic Control Facility (RATCF) -- An air traffic control facility, located at a U.S. Navy (USN) or Marine Corps (USMC) Air Station, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, the USN and the FAA, the USN, or the USMC. Service may be provided to both civil and military airports.

Radar Approach Control (RAPCON) -- An air traffic control facility, located at a U.S. Air Force (USAF) Base, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, or the USAF. Service may be provided to both civil and military airports.

Radio Contacts -- The initial radio call-up to a flight service station by enroute aircraft; a complete interchange of information and a termination of the contact.

RAPCON -- See RADAR APPROACH CONTROL.

RATCF -- See RADAR AIR TRAFFIC CONTROL FACILITY.

Registered Active General Aviation Aircraft -- A civil aircraft registered with the FAA that has been flown one or more hours during the previous calendar year. Excludes are aircraft owned and operated in regularly scheduled, nonscheduled, or charter service by commercial air carriers and aircraft in excess of 12,500 pounds maximum gross takeoff weight, and owned and operated by a commercial operator certificated by the FAA to engage in intrastate common carriage.

Research and Special Programs Administration (RSPA) -- The Research and Special Programs Administration of the U.S. Department of Transportation. Responsible for the collection of air carrier traffic and financial data on Form 41 that was collected formerly by the Civil Aeronautics Board.

Revenue Passenger Enplanements -- The total number of passengers boarding aircraft. Includes both originating and connecting passengers.

Revenue Passenger Load Factor -- Revenue passenger-miles as a percent of available seat-miles in revenue passenger services, i.e., the proportion of aircraft seating capacity that is actually sold and utilized.

Revenue Passenger Mile (RPM) -- One revenue passenger transported one mile in revenue service. Revenue passenger miles are computed by summation of the products of the revenue aircraft miles flown a flight stage, multiplied by the number of revenue passengers carried on that flight stage.

Revenue Ton Mile (RTM) -- One ton of revenue traffic transported one mile.

RPM -- See REVENUE PASSENGER MILE.

RSPA -- See Research and Special Program Administration

RTM -- See REVENUE TON MILE.

Secondary Airport -- An airport receiving approach control service as a satellite to a primary approach control facility, or one at which control is exercised by the approach control facility under tower en route control procedure.

Supplemental Air Carrier -- An air carrier certificated in accordance with FAR Part 121, and providing nonscheduled or supplemental carriage of passengers or cargo, or both, in air transportation. Also referred to as nonscheduled or charter air carriers.

Terminal Radar Approach Control (TRACON) -- An FAA traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service may be provided to both civil and military airports. A TRACON is similar to a RAPCON (USAF), RATCF (USN), and ARAC (Army).

Total Flight Services -- The sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted. No credit is allowed for airport advisories.

Total Operations -- All arrivals and departures performed by military, general aviation, commuter/air taxi, and air carrier aircraft.

Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

TRACON -- See TERMINAL RADAR APPROACH CONTROL.

U.S. Flag Carrier -- Air carrier holding a certificate issued by the Department of Transportation, and approved by the President, authorizing the carrier to provide scheduled operations over a specified route between the United States (and/or its territories) and one or more foreign countries.

VFR -- See VISUAL FLIGHT RULES.

VFR Tower -- An airport traffic control tower that does not provide approach control service.

Visual Flight Rules (VFR) -- Rules that govern the procedures for conducting flight under visual conditions. Also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. Used by pilots and controllers to indicate type of flight plan.

APPENDIX A

ACTIVE U.S. COMMERCIAL AIR CARRIERS

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
1. Aerial (AG)	F	MR	12-84	8-84
2. Air Wisconsin (ZW)	S	N	7-79	
3. Air Transport Int'l.	F	MR	10-88	10-88
4. Alaska (AS) (4)	S	N	X	
5. Aloha (AQ) (5)	S	N	X	6-84
6. American (AA) (6)	S	M	X	X
7. Amerijet	C	MR	10-87	10-87
8. America West (HP)	S	N	8-83	
9. American Trans Air	S	N	X	X
10. Arrow (JW)	S	LR	11-82	6-83
11. Aspen (AP) (7)	S	LR	1-85	
12. Buffalo	C	LR	4-84	9-88
13. Casino Express	C	MR	7-89	
14. Challenge Air Cargo	F	MR		7-86
15. Connor	F	MR	1-87	1-87
16. Connie Kalitta	F	LR	1-89	1-89
17. Continental (CO) (9)	S	M	X	X
18. Delta (DL) (10)	S	M	X	X
19. Eastern (EA)	S	M	X	X
20. Emerald (OD)	S	LR	7-82	
21. Emery	F	MR	1-90	
22. Evergreen (JO)	F	LR	X	X
23. Express One	F			1-89
24. Federal Express (FM) (11)	F	M	1-86	1-86
25. Florida West	F	MR	3-88	1-87
26. Great American (FD)	C	MR	10-80	
27. Hawaiian (HA)	S	N	X	10-84
28. Horizon Air (QX)	S	LR	9-84	
29. Independent Air	S	MR	9-94	9-84
30. International Air Service	C	LR	7-88	

ACTIVE U.S. COMMERCIAL

AIR CARRIERS (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
31. Jet Fleet (JL)	C	MR	1-90	
32. Key	C	LR	6-84	1-85
33. Markair (BF) (13)	S	LR	X	
34. Midway (ML)	S	N	11-79	
35. Midwest Express (YX)	S	LR	7-84	
36. Million	C	MR	10-87	1-86
37. MGM Grand (MG)	S	N	9-87	
38. North American	C	MR	1-90	
39. Northern Air Cargo (HU)	F	LR	12-82	
40. Northwest (NW) (14)	S	M	X	X
41. Pacific Interstate (QT)	S	LR	12-84	
42. Pan American (PA)	S	M	X	X
43. Private Jet	C	MR	3-90	2-90
44. Reeve (RV)	S	LR	X	
45. Rich (XR)	C	MR	1-82	
46. Rosenbalm	F	MR	4-85	4-85
47. Royal West	S	LR	7-86	
48. Southern Air	F	LR	5-80	4-80
49. Southwest (WN)	S	N	2-79	
50. Sun Country (SC)	C	MR	1-83	3-83
51. Tower (FF)	S	LR		11-83
52. TPI International	F	MR		3-90
53. Trans Air-Link	F	MR	1-84	1-84
54. Trans Continental	F	MR	1-89	1-89
55. Trans World (TW) (15)	S	M	X	X
56. Trump Shuttle	S	N	7-89	
57. United (UA)	S	M	X	4-83
58. United Parcel Service	F	N	10-88	10-88
59. Universal	F	MR		2-90
60. USAir (AL) (16)	S	M	X	

ACTIVE U.S. COMMERCIAL

AIR CARRIERS (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
61. West Air	S	LR	4-88	
62. World (WO)	C	N	7-80	5-81
63. Wrangler	F	MR		3-90
64. Zantop	F	LR	X	X

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to 1978 indicated by an X.

(4) Acquired Jet America.

(5) Discontinued international service 1/85.

(6) Acquired AirCal.

(7) Carrier reported as a commuter air carrier from 9/82 to 12/84.

(8) Carrier did not operate from 5/82 to 2/84.

(9) Acquired Frontier, New York Air and People Express.

(10) Acquired Western Airlines.

(11) Acquired Flying Tiger.

(12) Operates as a seasonal carrier from the months of December through May.

(13) Formerly Alaska International.

(14) Acquired Republic Airlines.

(15) Acquired Ozark Airlines.

(16) Acquired Pacific Southwest and Piedmont.

APPENDIX B

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
1. Aeromech (KC)	S	MR	7-79		5-81**
2. Aeron	F	MR		4-83	5-89*
3. Air America	S	LR			12-89*
4. Air Atlanta (CC)	S	LR	2-84		7-86*
5. AirCal (OC)	S	N	1-79		3-87m
6. Air Florida (QH)	S	N	1-79	7-80	5-84*
7. Air Illinois (UX)	S	LR	1-83		2-84*
8. Airlift (RD)	C	MR	7-84	7-84	12-85*
9. Airmark	C	MR	8-84	9-84	12-84*
10. Air Midwest (ZV)	S	LR	X		12-84**
11. Air National (AH)	C	LR		4-84	6-84*
12. Air Nevada (LW)	S	MR	4-81		7-82**
13. Air New England (NE)	S	MR	X		10-81*
14. Air North (NO)	S	MR	6-80		8-82**
15. Air North/Nenana (XG)	S	MR	3-81		8-82**
16. Air One (CB)	S	LR	4-83		7-84*
17. AirPac (RI)	S	LR	4-84		12-85*
18. All Star (LS)	S	MR	4-83	4-83	10-85*
19. Altair (AK)	S	MR	1-79		9-82*
20. American Int'l. (AV)	S	LR	11-82		9-84*
21. Apollo (ID)	S	MR	5-79		7-81**
22. Arista (RI)	C	MR	12-82	8-82	3-84*
23. Atlantic Gulf (ZY)	C	MR	9-85		7-86*
24. Best (IW)	S	MR	7-82		10-85**
25. Big Sky (GQ)	S	MR	6-79		9-82**
26. Blue Bell (BB)	C	MR	6-83		2-84*
27. Braniff (BN) (8)	S	N	3-84	6-89*	
28. Britt (RU)	S	LR	10-84		6-87**
29. Cascade (CZ)	S	LR	1-85		11-85*
30. Capitol (CL)	S	N	7-80	7-81	9-84*

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
31. Challenge (CN)	F	MR		8-82	6-86*
32. Challenge Air Int'l.	S	MR		7-86	8-87*
33. Cochise (DP)	S	MR	1-79		12-81*
34. Coleman (CH)	S	MR	9-79		3-80*
35. Colgan (CJ)	S	MR	4-81		3-83**
36. Discovery	S	LR	3-90		7-90*
37. Empire (UR)	S	LR	10-79		4-86m
38. Five Star (12)	C	LR	12-85		5-89*
39. Flight International	C	MR	4-84	6-84	9-85*
40. Florida Express (ZO)	S	LR	1-84	1-87	2-89m
41. Flying Tiger (FT)	F	M	X	X	8-89m
42. Frontier (FL)	S	N	X	X	8-86m
43. Frontier Horizon (FH)	S	LR	1-84		1-85*
44. Galaxy (GY)	C	MR	10-83	12-83	5-87*
45. Global (GL)	C	LR	X	X	12-84*
46. Golden Gate (GG)	S	MR	5-80		7-81*
47. Golden West (GW)	S	MR	2-79		7-82**
48. Gulf Air Transport (GA)	C	MR		1-85	12-89*
49. Guy America (HX)	S	MR		8-81	2-83*
50. Hawaii Express (LP)	S	LR	10-82		10-83*
51. Imperial (II)	S	MR	1-80		6-82**
52. Int'l. Air Service (IE)	C	LR	11-83		5-85*
53. Interstate	F	LR	5-85	5-85	10-87*
54. Jet America (SI)	S	N	1-82		8-87m
55. Jet Charter	C	MR	7-82	7-82	5-85*
56. Kodiak (KO)	S	MR	X		11-82**
57. L.A.B. (JF)	S	MR	1-82		8-82**
58. McClain (MU)	S	LR	11-86		2-87**
59. Mid-South (VL)	S	MR	6-80		2-84*
60. Midstate (IU)	S	MR	7-81		7-82**

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
61. Mid Pacific (HO)	S	LR	10-85		9-87*
62. Midway Express	S	LR	10-84		7-85*
63. Mississippi Valley (XV)	S	MR	4-79		8-82**
64. Munz (XY)	S	MR	X		8-83*
65. New Air (NC)	S	MR	5-79		9-82**
66. New York Air (NY)	S	N	12-80		12-86m
67. New Wien (WC)	S	MR	9-85		10-85*
68. Northeastern (QS)	S	LR	7-84		2-85*
69. Orion	F	MR	1-87	1-87	12-89
70. Overseas (OV)	C	LR	10-82		10-85*
71. Ozark (OZ)	S	N	X		9-86m
72. Pacific East (PR)	S	LR	9-82		3-84*
73. Pacific Express (VB)	S	LR	2-82		10-83*
74. Pacific Southwest (PS)	S	N	1-79		4-88m
75. Peninsula (KS)	S	MR	1-82		1-83**
76. People Express (PE)	S	N	5-81	5-83	12-86m
77. Piedmont (PI)	S	M	X	7-87	8-89m
78. Pilgrim (PM)	S	LR	9-85		12-86*
79. Ports of Call Travel Club	C	LR	9-85		1-86*
80. Presidential (XV)	S	LR	10-85	11-89*	
81. Pride Air (NI)	S	LR	10-85		11-85*
82. Republic (RC)	S	M	X		9-86m
83. Rocky Mountain (JC)	S	MR	7-81		9-82**
84. Royale (OQ)	S	LR	3-84		6-84**
85. Ryan	C	LR	4-84	4-84	5-86*
86. Sea Airmotive (KJ)	S	MR	1-80		6-82**
87. Sky Bus (FW)	S	MR	7-85		11-86*
88. Skystar	C	MR	1-85	3-85	1-87*
89. Sky West (QG)	S	MR	7-79		12-84**
90. Sky World	C	LR	10-85	10-85	7-89*

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
91. Samoa (MB)	S	MR		2-85	6-85*
92. Southeast (NS)	S	MR	7-79		1-80*
93. South Pacific Island (HK)	S	LR		7-81	11-86*
94. Sun Coast (WS)	C	MR		5-87	9-87*
95. Sunworld (JK)	S	LR	5-83		9-88
96. Swift Aire (WI)	S	MR	1-79		7-81*
97. T-Bird (DQ)	C	MR		4-82	8-84*
98. Total Air (TA)	C	MR	10-84	5-85	1-87*
99. Transamerica (TV)	S	N		5-79	9-86*
100. Trans International	F	MR	5-85	1-85	12-88*
101. Transtar (MA)	S	LR	8-81		8-87m
102. Wien (WC)	S	N	X		11-84*
103. Western (WA)	S	M	X	X	3-87m
104. Western Yukon (WX)	S	MR	7-81		6-82*
105. Worldwide	C	MR	10-84	10-84	3-86*
106. Wright (FW)	S	MR	X		11-82**

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to deregulation indicated by an X.

(4) Date of last reported traffic is indicated. Carriers that have discontinued scheduled passenger service indicated by an *. Carriers now filing RSPA Form 298-C in lieu of RSPA Form 41 indicated by **. Carriers that have merged operations indicated by an m.

APPENDIX C

U.S. AIR CARRIERS

NONSCHEDULED TRAFFIC AND CAPACITY

DOMESTIC

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1981	2,914	2,173	74.6	1.555
1982	3,007	2,160	71.8	1,641
1983	6,854	5,109	74.5	2,882
1984	8,142	6,078	74.6	3,840
1985	9,841	7,491	76.1	5,318
1986	8,404	6,345	75.5	4,856
1987	6,170	4,422	71.7	3,933
1988	6,651	4,954	74.5	4,490
1989	6,862	5,128	74.7	4,887
1990E	7,293	5,508	75.5	5,149

INTERNATIONAL

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1981	3,391	2,922	86.2	904
1982	4,260	3,643	85.5	1,149
1983	9,443	8,045	85.2	3,034
1984	8,513	7,385	86.8	2,824
1985	8,637	7,438	86.1	2,857
1986	7,517	6,327	84.2	2,662
1987	10,510	8,626	82.1	3,708
1988	11,118	9,148	82.3	3,932
1989	12,165	9,444	77.6	4,660
1990E	11,316	8,192	72.4	3,921

U.S. AIR CARRIERS

NONSCHEDULED TRAFFIC AND CAPACITY (Continued)

	TOTAL			
FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1981	6,305	5,095	80.8	2,459
1982	7,267	5,803	79.9	2,790
1983	16,297	13,154	80.7	5,916
1984	16,655	13,463	80.8	6,664
1985	18,478	14,929	80.8	8,175
1986	15,921	12,672	79.6	7,518
1987	16,680	13,048	78.2	7,641
1988	17,769	14,102	79.4	8,422
1989	19,027	14,570	76.6	9,547
1990E	18,609	13,700	73.6	9,070

Source: RSPA Form 41

APPENDIX D

U.S. AIR CARRIERS

CARGO REVENUE TON MILES
(In Millions)

FREIGHT/EXPRESS RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1981	3,365	2,651	6,016
1982	3,144	2,792	5,936
1983	3,809	2,910	6,719
1984	4,391	3,328	7,719
1985	3,943	3,340	7,284
1986	4,869	3,988	8,857
1987	5,782	4,781	10,563
1988	6,699	5,702	12,401
1989	7,413	6,749	14,162
1990E	7,418	6,790	14,208

MAIL RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1981	994	376	1,370
1982	999	392	1,391
1983	1,040	400	1,440
1984	1,145	441	1,586
1985	1,203	450	1,653
1986	1,233	438	1,671
1987	1,314	435	1,749
1988	1,423	463	1,886
1989	1,463	488	1,951
1990E	1,475	517	1,992

U.S. AIR CARRIERS
CARGO REVENUE TON MILES (Continued)
(In Millions)

	TOTAL RTM'S		
FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1981	4,359	3,027	7,386
1982	4,143	3,184	7,327
1983	4,849	3,310	8,159
1984	5,536	3,769	9,305
1985	5,146	3,790	8,936
1986	6,102	4,426	10,528
1987	7,096	5,216	12,312
1988	8,122	6,165	14,287
1989	8,876	7,237	16,113
1990E	8,893	7,307	16,200

Source: RSPA Form 41

APPENDIX E

ACTIVE U.S. REGIONALS/COMMUTERS

1. Action Air
2. Aero Coach
3. Air Cape
4. Air LA
5. Air Midwest
6. Air Nevada
7. Air Sedona
8. Air Sunshine
9. Air Vegas
10. Airlift International
11. Airways International
12. Alaska Island Air*
13. Aleutian Air*
14. Alleghany Commuter
15. Aloha IslandAir
16. Alpha Air
17. Alpine Air
18. Arctic Circle*
19. Aspen
20. Atlantic Southeast
21. Baker Aviation*
22. Bar Harbor
23. Barrow Air*
24. Bellair*
25. Bemidji
26. Bering Air*
27. Big Sky
28. Britt
29. Business Express
30. California Air Shuttle
31. Cape Air
32. Cape Smythe*
33. CCAir
34. Central States
35. Chalks/PIA
36. Chaparral
37. Chartair
38. Chautauqua
39. Chitna Air Service*
40. Christman Air System
41. Coastal Air Transport
42. Coastal Airways
43. Comair
44. Command
45. Commutair
46. Conquest
47. Crown Airways
48. Cumberland
49. Direct Air
50. East Hampton Air
51. Eastern Metro Express
52. Empire Airways
53. Enterprise
54. ERA Aviation*
55. Executive Air Charter
56. Executive Express II
57. Express Airlines I
58. Flamenco
59. Flight Trails
60. Freedom Air*

ACTIVE U.S. REGIONALS/COMMUTERS (Continued)

61. Frontier Flying Service*
62. GCS Air Service
63. GP Express
64. Grand Airways
65. Grand Canyon Helicopters

66. Great Lakes Aviation
67. Gulf Air Taxi
68. Gulkana Air Service*
69. Haines Airways*
70. Harbor Air Service*

71. Harbor Airlines(Oak Harbor)
72. Helitrans
73. Henson Aviation
74. Hermens Air*
75. Horizon Airlines

76. Horizon Air(Mohawk)
77. Hub Express
78. Iliamna Air Taxi*
79. Inlet Airlines*
80. Iowa Airways

81. Jet Express
82. Jetstream International
83. Kenmore Air Harbor
84. Ketchikan Air Harbor*
85. LAB Flying Service*

86. Lake Union Air Service*
87. Larry's Flying Service*
88. Las Vegas Airlines
89. Long Island Airlines
90. L'Express Airlines

91. Mall Airways
92. Mesa Airlines
93. Mesaba Airlines
94. Metro Northeast(ANO)
95. Metro Northeast(CAP)

96. Metro-Flight Airlines
97. Michigan Airways
98. Midway Commuter
99. Midwest Aviation
100. Nashvilles Eagle

101. New England Airlines
102. New York Helicopters
103. Northcoast Executive
104. North Pacific/NPA
105. Olson Air Service*

106. Pacific Coast Airlines
107. Pan Am Express
108. Panama Aviation
109. Panorama Air Tours
110. Peninsula Airways*

111. Pennsylvania Airlines
112. Pocono Airlines
113. Precision Airlines
114. Propheter Aviation
115. Rocky Mountain Airways

116. Ross Aviation
117. Ryan Air Service*
118. Samoa Air*
119. Scenic Airlines
120. Simmons Airlines

121. Skagway Air Service*
122. Sky West Aviation
123. Southcentral Air*
124. Southern Jersey
125. Springdale Air

126. StatesWest Airlines
127. Sunaire(Aviation Associates)
128. Tanana Air Service*
129. Taquan Air Service*
130. Tatonduk Flying Service*

131. Temsco Airlinese*
132. Trans States Airlines
133. Trump Air
134. Valley Air Service*
135. Valley Airlines

136. Viequies Air Link
137. Village Aviation(Camai Air)*
138. Virgin Air
139. Walker's International
140. WestAir

ACTIVE U.S. REGIONALS/COMMUTERS (Continued)

141. Westates Airlines
142. Wilbur's Inc.*
143. Wings Airways(PA)
144. Wings of Alaska*
145. Wings West
146. WRA Inc.*
147. Wrangell Air Service*
148. Wright Air Service*
149. Yutana Airlines*
150. Yute Air Alaska*
151. 40-Mile Air*

* Carriers, primarily in Alaska, whose traffic is not included in the regional/commuter data base and forecast.

APPENDIX F

GENERAL AVIATION AIRCRAFT COST INDICES

SINGLE ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	93.7	86.4	98.2	95.0
1971	95.7	93.2	98.8	97.4
1972	100.0	100.0	100.0	100.0
1973	100.0	109.2	109.9	109.8
1974	100.0	129.6	148.8	143.6
1975	114.1	138.9	158.9	153.6
1976	132.4	169.1	173.1	172.1
1977	142.2	184.5	202.2	197.5
1978	149.9	192.0	230.9	220.5
1979	165.6	201.1	287.6	264.5
1980	173.8	214.8	364.6	324.5
1981	216.6	227.8	425.7	372.7
1982	245.3	256.2	443.7	393.6
1983	280.7	269.1	450.6	401.9
1984	304.3	279.6	446.1	401.5
1985	316.4	289.1	436.8	397.1
1986	338.4	294.6	411.9	380.4
1987	*	300.0	405.3	376.9
1988	*	308.5	405.3	379.2
1989	*	317.6	405.3	381.6
1990	*	328.5	430.3	402.8

* Not calculated because all models in index have stopped production.

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

MULTI-ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	82.6	96.7	98.1	97.5
1971	90.5	99.9	98.8	99.2
1972	100.0	100.0	100.0	100.0
1973	100.0	109.0	109.9	109.5
1974	102.9	130.0	148.6	140.5
1975	117.5	150.0	158.8	154.9
1976	128.6	172.8	173.0	173.0
1977	137.6	187.8	202.0	196.8
1978	151.8	196.5	230.8	215.8
1979	168.9	207.1	287.3	252.1
1980	185.3	216.6	364.2	299.5
1981	211.3	226.5	425.3	338.1
1982	232.9	240.6	443.4	359.2
1983	248.0	250.4	450.2	362.6
1984	289.4	260.0	445.7	364.3
1985	327.5	268.8	436.7	363.1
1986	343.2	274.2	411.7	351.2
1987	341.0	279.3	405.0	349.6
1988	367.6	287.2	405.0	353.1
1989	400.7	295.6	405.0	356.8
1990	439.9	305.8	429.9	375.2

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

TURBOPROP AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.7	99.3	92.7	95.3
1971	93.9	103.1	97.9	99.9
1972	100.0	100.0	100.0	100.0
1973	100.0	108.9	118.8	114.8
1974	103.0	130.0	146.6	139.9
1975	113.8	144.4	156.8	151.7
1976	125.6	150.2	164.6	158.7
1977	125.6	144.1	181.9	166.6
1978	131.9	156.8	221.4	195.2
1979	145.0	160.7	296.9	241.8
1980	157.8	163.4	354.0	276.9
1981	182.7	169.6	403.8	309.0
1982	189.9	180.2	420.8	323.2
1983	204.3	187.5	434.7	334.6
1984	213.0	194.7	434.7	337.5
1985	236.2	201.3	429.9	335.4
1986	247.5	205.3	384.8	310.2
1987	251.8	209.1	384.8	311.7
1988	295.6	215.0	384.8	314.1
1989	318.4	221.3	384.8	316.7
1990	343.1	228.9	422.4	342.2

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

TURBOJET AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.0	94.6	92.6	93.3
1971	87.0	96.2	97.8	97.2
1972	100.0	100.0	100.0	100.0
1973	100.2	109.0	118.7	115.6
1974	104.7	130.0	127.4	128.2
1975	115.1	140.2	156.8	151.4
1976	123.4	153.5	164.6	160.9
1977	135.9	167.6	181.9	177.3
1978	151.5	174.3	221.4	206.2
1979	167.2	179.4	296.9	259.0
1980	205.7	182.7	353.9	298.7
1981	216.7	187.1	403.8	333.9
1982	240.4	198.7	420.8	348.9
1983	251.8	206.7	434.7	361.2
1984	266.2	214.7	434.7	363.7
1985	278.4	221.3	429.9	362.8
1986	299.0	225.7	384.8	333.8
1987	309.3	229.9	384.8	335.2
1988	328.2	236.4	384.8	337.3
1989	326.9	243.3	384.8	339.5
1990	363.1	251.7	422.8	368.0

Source: FAA-APO Estimates

APPENDIX G

FAA TOWERED AIRPORTS

Birmingham, AL (BHM)
Dothan, AL (DHN)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)

Tuscaloosa Van De Graaf, AL (TCL)
Anchorage International, AK (ANC)
Anchorage Lake Hood SPB, AK (LHD)
Anchorage Merrill, AK (MRI)
Bethel, AK (BET)

Fairbanks International, AK (FAI)
Juneau, AK (JNU)
Kenai Municipal, AK (ENA)
King Salmon, AK (AKN)
Kodiak, AK (ADQ)

Tanacross, AK (TSG)
Valdez, AK (VDZ)
Deer Valley, AZ (DVT)
Falcon/Mesa, AZ (FFZ)
Goodyear, AZ (GYR)

Grand Canyon Municipal, AZ (GCN)
Phoenix Sky Harbor Int'l., AZ (PHX)
Prescott, AZ (PRC)
Scottsdale, AZ (SDL)
Tucson, AZ (TUS)

Fayetteville Drake Field, AR (FYV)
Fort Smith Municipal, AR (FSM)
Little Rock Adams Field, AR (LIT)
Texarkana, AR (TXK)
Bakersfield Meadows Field, CA (BFL)

Burbank, CA (BUR)
Camarillo, CA (CNA)
Carlsbad Palomar, CA (CRQ)
Chico, CA (CIC)
Chino, CA (CNO)

Concord, CA (CCR)
El Monte, CA (EMT)
Fresno Air Terminal, CA (FAT)
Fullerton Municipal, CA (FUL)
Hawthorne, CA (HHR)

Hayward, CA (HWD)
La Verne Brackett, CA (POC)
Lancaster Fox Airport, CA (WJF)
Livermore Municipal, CA (LVK)
Long Beach, CA (LGB)

Los Angeles International, CA (LAX)
Modesto City County, CA (MOD)
Monterey, CA (MRY)
Napa County, CA (APC)
Oakland International, CA (OAK)

Ontario, CA (ONT)
Oxnard Ventura County, CA (OXR)
Palm Springs Municipal, CA (PSP)
Palmdale, CA (PMD)
Palo Alto, CA (PAO)

Redding, CA (RDD)
Riverside Municipal, CA (RAL)
Sacramento Executive, CA (SAC)
Sacramento Metro, CA (SMF)
Salinas Municipal, CA (SNS)

San Carlos, CA (SQL)
San Diego Brown Field, CA (SDM)
San Diego Gillespi, CA (SEE)
San Diego Lindberg, CA (SAN)
San Diego Montgomery, CA (MYF)

San Franciso, CA (SFO)
San Jose International, CA (SJC)
San Jose Reid Hillview, CA (RHV)
San Luis Obispo, CA (SBP)
Santa Ana, CA (SNA)

FAA TOWERED AIRPORTS

Santa Barbara, CA (SBA)
Santa Maria Public, CA (SMX)
Santa Monica, CA (SMO)
Santa Rosa Sonoma County, CA (STS)
South Lake Tahoe, CA (TVL)

Stockton, CA (SCK)
Torrance Municipal, CA (TOA)
Van Nuys, CA (VNY)
Aspen Pitkin County, CO (ASE)
Broomfield Jefferson County, CO (BJC)

Colorado Springs, CO (COS)
Denver Stapleton Int'l., CO (DEN)
Denver/Centennial, CO (APA)
Grand Junction, CO (GJT)
Pueblo, CO (PUB)

Bridgeport, CT (BDR)
Danbury Municipal, CT (DXR)
Groton Trumbull, CT (GON)
Hartford Brainard, CT (HFD)
New Haven, CT (HVN)

Windsor Locks, CT (BDL)
Wilmington Greater Wilmington, DE (ILG)
Washington National, DC (DCA)
Craig Field Jacksonville, FL (CRG)
Daytona Beach, FL (DAB)

Fort Lauderdale, FL (FLL)
Fort Lauderdale Executive, FL (FXE)
Fort Myers Page Field, FL (FMY)
Fort Myers Regional, FL (RSW)
Fort Pierce, FL (FPR)

Gainesville, FL (GNV)
Hollywood, FL (HWO)
Jacksonville International, FL (JAX)
Key West, FL (EYW)
Melbourne, FL (MLB)

Miami International, FL (MIA)
Opa Locka, FL (OPF)
Orlando Executive, FL (ORL)
Orlando International Airport, FL (MCO)
Panama City Bay County, FL (PFN)

Pensacola, FL (PNS)
Pompano Beach Airpak, FL (PMP)
Sarasota Bradenton, FL (SRQ)
St. Petersburg Clearwater, FL (PIE)
St. Petersburg Whitt, FL (SPG)

Tallahassee, FL (TLH)
Tamiami, FL (TMB)
Tampa International, FL (TPA)
Vero Beach, FL (VRB)
West Palm Beach, FL (PBI)

Albany, GA (ABY)
Atlanta DeKalb Peachtree, GA (PDK)
Atlanta Fulton County, GA (FTY)
Atlanta International, GA (ATL)
Augusta, GA (AGS)

Columbus, GA (CSG)
Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Valdosta, GA (VLD)
Hilo General Lyman Field, HI (ITO)

Honolulu, HI (HNL)
Kahului, HI (OGG)
Kona Ke Ahole, HI (KOA)
Lihue, HI (LIH)
Molokai, HI (MKK)

Boise, ID (BOI)
Idaho Falls Fanning Field, ID (IDA)
Lewiston, ID (LWS)
Pocatello, ID (PIN)
Twin Falls, ID (TWF)

Alton Civic Memorial, IL (ALN)
Aurora Municipal, IL (ARR)
Bloomington Normal, IL (BMI)
Carbondale, IL (MDH)
Champaign Univeristy of Illinois, IL (CMI)

Chicago Du Page, IL (DPA)
Chicago Meigs, IL (CGX)
Chicago Midway, IL (MDW)
Chicago O'Hare International, IL (ORD)
Chicago Palwaukee, IL (PWK)

FAA TOWERED AIRPORTS

Decatur, IL (DEC)
East St. Louis Bi State Park, IL (CPS)
Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)

Springfield Capital, IL (SPI)
Bloomington Monroe County, IN (BMG)
Evansville, IN (EVV)
Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)

Lafayett Purdue University, IN (LAF)
Muncie Delaware County, IN (MIE)
South Bend, IN (SBN)
Terre Haute, IN (HUF)
Cedar Rapids, IA (CID)

Des Moines Municipal, IA (DSM)
Dubuque, IA (DBQ)
Sioux City Municipal, IA (SUX)
Waterloo, IA (ALO)
Hutchinson, KS (HUT)

Olathe, KS (OJC)
Salina, KS (SLN)
Topeka Forbes AFB, KS (FOE)
Wichita Mid Continent, KS (ICT)
Cincinnati Greater, KY (CVG)

Lexington, KY (LEX)
Louisville Bowman, KY (LOU)
Louisville Standiford, KY (SDF)
Alexandria, LA (ESF)
Baton Rouge Ryan Field, LA (BTR)

Houma, LA (HUM)
Lafayette, LA (LFT)
Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Lakefront, LA (NEW)

New Orleans Moesant, LA (MSY)
Shreveport, LA (SHV)
Shreveport Downtown, LA (DTN)
Bangor International, ME (BGR)
Portland, ME (PWM)

Baltimore Washington Int'l, MD (BWI)
Camp Springs, MD (ADW)
Hagerstown, MD (HGR)
Bedford, MA (BED)
Beverly Muncipal, MA (BVY)

Boston Logan, MA (BOS)
Hyannis, MA (HYA)
Lawrence, MA (LWN)
Natucket Memorial, MA (ACK)
New Bedford, MA (EWB)

Norwood, MA (OWD)
Westfield, MA (BAF)
Worcester, MA (ORH)
Ann Arbor Municipal, MI (ARB)
Battle Creek, MI (BTL)

Detroit City, MI (DET)
Detroit Metro Wayne County, MI (DTW)
Detroit Willow Run, MI (YIP)
Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)

Jackson Reynolds Municipal, MI (JXN)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)
Muskegon, MI (MKG)
Pontiac, MI (PTK)

Saginaw Tri City, MI (MBS)
Traverse City, MI (TVC)
Duluth, MN (DLH)
Minneapolis Crystal, MN (MIC)
Minneapolis Flying Cloud, MN (FCM)

Minneapolis St. Paul Int'l., MN (MSP)
Rochester, MN (RST)
St. Paul, MN (STP)
Greenville Municipal, MS (GLH)
Gulfport, MS (GPT)

Jackson Hawkins, MS (HKS)
Jackson Municipal Airport, MS (JAN)
Meridian Key, MS (MEI)
Columbia Regional, MO (COU)
Joplin, MO (JLN)

FAA TOWERED AIRPORTS

Kansas City International, MO (MCI)
Kansas City Municipal, MO (MKC)
Springfield, MO (SGF)
St. Joseph, MO (STJ)
St. Louis International, MO (STL)

St. Louis Spirit of St. Louis, MO (SUS)
Billings, MT (BIL)
Great Falls, MT (GTF)
Helena, MT (HLN)
Missoula, MT (MSO)

Grand Island, NE (GRI)
Lincoln Municipal, NE (LNK)
Omaha, NE (OMA)
Las Vegas Int'l, NV (LAS)
North Las Vegas, NV (VGT)

Reno, NV (RNO)
Lebanon, NH (LEB)
Manchester, NH (MHT)
Atlantic City, NJ (ACY)
Caldwell, NJ (CDW)

Morristown, NJ (MMU)
Newark, NJ (EWR)
Teterboro, NJ (TEB)
Trenton, NJ (TTN)
Albuquerque Int'l, NM (ABQ)

Roswell, NM (ROW)
Santa Fe, NM (SAF)
Albany County, NY (ALB)
Binghamton Broome Cnty., NY (BGM)
Buffalo International, NY (BUF)

Elmira, NY (ELM)
Farmingdale, NY (FRG)
Islip McArthur, NY (ISP)
Ithaca Tompkins County, NY (ITH)
John F. Kennedy International, NY (JFK)

La Guardia, NY (LGA)
Niagara Falls, NY (IAG)
Poughkeepsie Dutchess County, NY (POU)
Rochester Monroe County, NY (ROC)
Syracuse Hancock International, NY (SYR)

Utica, NY (UCA)
White Plains Westchester, NY (HPN)
Asheville, NC (AVL)
Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)

Greensboro Regional, (GSO)
Kinston, NC (ISO)
Raleigh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)
Winston Salem, NC (INT)

Bismark, ND (BIS)
Fargo Hector Field, ND (FAR)
Grand Forks International, ND (GFK)
Minot International, ND (MOT)
Akron Canton Regional, OH (CAK)

Cincinnati Lunken, OH (LUK)
Cleveland Burke Lakefront, OH (BKL)
Cleveland Hopkins Int'l, OH (CLE)
Columbus International, OH (CMH)
Columbus Ohio State, OH (OSU)

Dayton, OH (DAY)
Mansfield Lahm Municipal, OH (MFD)
Toledo Express, OH (TDL)
Youngstown, OH (YNG)
Clinton Sherman, OK (CSM)

Lawton Municipal, OK (LAW)
Oklahoma City Wiley Post, OK (PWA)
Oklahoma City Will Rogers, OK (OKC)
Tulsa International, OK (TUL)
Tulsa Riverside, OK (RVS)

Eugene, OR (EUG)
Hillsboro, OR (HIO)
Klamath Falls, OR (LMT)
Medford Jackson County, OR (MFR)
Portland International, OR (PDX)

Salem McNary Field, OR (SLE)
Troutdale, OR (TTD)
Allentown, PA (ABE)
Capital, City/Harrisburg, PA (CXY)
Erie, PA (ERI)

FAA TOWERED AIRPORTS

Harrisburg International, PA (MDT)
Lancaster, PA (LNS)
North Philadelphia, PA (PNE)
Philadelphia International, PA (PHL)
Pittsburgh Allegheny, PA (AGC)

Pittsburgh Greater International, PA (PIT)
Reading, PA (RDG)
Wilkes Barre, PA (AVP)
Williamsport, PA (IPT)
Providence, RI (PVD)

Charleston AFB Municipal, SC (CHS)
Columbia Metropolitan, SC (CAE)
Florence City, SC (FLO)
Greenville Municipal, SC (GMU)
Greer, SC (GSP)

Rapid City, SD (RAP)
Sioux Falls Foss Field, SD (FSD)
Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)

Memphis International, TN (MEM)
Nashville Metropolitan, TN (BNA)
Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)

Beaumont Port Arthur, TX (BPT)
Brownsville International, TX (BRO)
College Station, TX (CLL)
Corpus Christi, TX (CRP)
Dallas Addison, TX (ADS)

Dallas Love Field, TX (DAL)
Dallas Redbird, TX (RBD)
Dallas/Ft. Worth Int'l, TX (DFW)
El Paso International, TX (ELP)
Fort Worth Meacham, TX (FTW)

Fort Worth Alliance, TX (AFW)
Harlingen Industrial, TX (HRL)
Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)
Longview, TX (GGG)

Lubbock, TX (LBB)
McAllen, TX (MFE)
Midland, TX (MAF)
San Angelo, TX (SJT)
San Antonio International, TX (SAT)

San Antonio Stinson, TX (SSF)
Tomball D. W. Hooks, TX (DWH)
Tyler, TX (TYR)
Waco Municipal, TX (ACT)
Ogden Municipal, UT (OGD)

Salt Lake City Int'l, UT (SLC)
Burlington International, VT (BTV)
Charlottesville Albemarle, VA (CHO)
Lynchburg, VA (LYH)
Newport News, VA (PHF)

Norfolk International, VA (ORF)
Richmond Byrd Int'l, VA (RIC)
Roanoke, VA (ROA)
Washington Dulles Int'l, VA (IAD)
St. Croix Alex Hamilton, VI (STX)

St. Thomas H.S. Thomas, VI (STT)
Everett Paine Field, WA (PAE)
Moses Lake Grant, WA (MWH)
Olympia, WA (OLM)
Renton, WA (RNT)

Seattle Boeing, WA (BFI)
Seattle Tacoma Int'l, WA (SEA)
Spokane Felts Field, WA (SFF)
Spokane International, WA (GEG)
Tacoma Narrows, WA (TIW)

Walla Walla, WA (ALW)
Yakima Air Terminal, WA (YKM)
Charleston, WV (CRW)
Clarksburg Benendum, WV (CKB)
Huntington, WV (HTS)

Morgantown, WV (MGW)
Parkersburg Wood County, WV (PKB)
Wheeling, WV (HLG)
Appleton, WI (ATW)
Green Bay Austin Straubel, WI (GRB)

FAA TOWERED AIRPORTS

Janesville, WI (JVL)
Lacrosse, WI (LSE)
Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
Milwaukee Timmerman, WI (MWG)

Oshkosh Wittman Field, WI (OSH)
Casper, WY (CPR)
Cheyene, WY (CYS)
San Juan International, PR (SJU)
San Juan Isla Grande, PR (SIG)

Kwajalein AAF, WK (KWA)
Pago Pago International, AS (TUT)
Martha's Vineyard, MA (MVY)-Seasonal

APPENDIX H

CONTRACT TOWERS

1. Flagstaff, Arizona (FLG)
2. Pacoima/Whitman, California (WHP)
3. Lakeland, Florida (LAL)
4. Hailey, Idaho (SUN)
5. Marion Williamson County, Illinois (MWA)
6. Waukegan, Illinois (UGN)
7. Topeka-Phillip Ballard, Kansas (TOP)
8. Owensboro-Daviees County, Kentucky (OWB)
9. Paducah Barkley Field, Kentucky (PAH)
10. Martha's Vineyard, Massachusetts (MVY)
11. Cape Girardeau, Missouri (CGI)
12. Nashua, New Hampshire (ASH)
13. Farmington Municipal, New Mexico (FMN)
14. Hobbs Lea, New Mexico (HOB)
15. Cleveland-Cuyahoga County, Ohio (CGF)

CONTRACT TOWERS (Continued)

16. Ardmore Municipal, Oklahoma (ADM)
17. Enid Woodring Memorial, Oklahoma (WDG)
18. Pendleton, Oregon (PDT)
19. Myrtle Beach, South Carolina (CRE)
20. Laredo, Texas (LRD)
21. Bellingham, Washington (BLI)
22. Lewisburg-Greenbrier, West Virginia (LWB)

APPENDIX I

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Birmingham, AL (BHM)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)
Anchorage International, AK (ANC)

Phoenix Sky Harbor Int'l., AZ (PHX/P50*)
Tucson, AZ (TUS/U90)
Fort Smith Municipal, AR (FSM)
Little Rock Adams Field, AR (LIT)
Burbank, CA (BUR/B90*)

El Toro, CA (NZJ)*
Fresno Air Terminal, CA (FAT)
Los Angeles Int'l, CA (LAX/L56*)
Monterey, CA (MRY)
Oakland International, CA (OAK/O90*)

Ontario, CA (ONT/O40*)
Palm Springs Municipal, CA (PSP)
San Jose International, CA (SJC)
Sacramento Metro, CA (SME/MCC*)
San Diego Lindberg, CA (SAN/NKX*)

Santa Ana/Orange County, CA (SNA)
Santa Barbara, CA (SBA)
San Francisco, CA (SFO)
Colorado Springs, CO (COS)
Denver Stapleton Int'l, CO (DEN/D84*)

Hartford Bradley Int'l, CT (BDL/Y90*)
Washington National, DC (DCA)
Daytona Beach, FL (DAB)
Fort Lauderdale, FL (FLL)
Fort Myers Regional, FL (RSW)

Jacksonville International, FL (JAX)
Miami International, FL (MIA)
Orlando Int'l Airport, FL (MCO)
Pensacola, FL (PNS/P31*)
Sarasota Bradenton, FL (SRQ)

Tallahassee, FL (TLH)
Tampa International, FL (TPA)
West Palm Beach, FL (PBI)
Atlanta International, GA (ATL)
Augusta, GA (AGS)

Columbus, GA (CSG)
Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Honolulu, HI (HNL)
Honolulu, HI (ZHN)

Kahului, HI (OGG)
Boise, ID (BOI)
Champaign Univ. of Illinois, IL (CMI)
Chicago Midway, IL (MDW)
Chicago O'Hare Int'l, IL (ORD/C90*)

Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)
Springfield Capital, IL (SPI)
Evansville, IN (EVV)

Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)
South Bend, IN (SBN)
Cedar Rapids, IA (CID)
Des Moines Municipal, IA (DSM)

Wichita Mid Continent, KS (ICT)
Cincinnati Greater, KY (CVG)
Lexington, KY (LEX)
Louisville Standiford, KY (SDF)
Baton Rouge Ryan Field, LA (BTR)

Lafayette, LA (LFT)
Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Moisant, LA (MSY)
Shreveport, LA (SHV)

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Bangor International, ME (BGR)
Portland, ME (PWM)
Baltimore Washington Int'l, MD (BWI)
Camp Springs Andrews AFB, MD (ADW)
Boston Logan, MA (BOS/A90*)

Detroit Metro Wayne County, MI (DTW/D21*)
Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)

Muskegon, MI (MKG)
Saginaw Tri City, MI (MBS)
Minneapolis St. Paul, MN (MSP/M98*)
Gulfport, MS (GPT)
Jackson Municipal Airport, MS (JAN)

Kansas City International, MO (MCI)
St. Louis International, MO (STL/T75*)
Billings, MT (BIL)
Great Falls, MT (GTF)
Lincoln Municipal, NE (LNK)

Omaha, NE (OMA/R90*)
Las Vegas McCarrna Int'l., NV (LAS)
Reno International, NV (RNO)
Atlantic City, NJ (ACY)
Newark, NJ (EWR)

Albuquerque International, NM (ABQ)
Albany County, NY (ALB)
Binghamton Broome County, NY (BGM)
Buffalo International, NY (BUF)
Elmira, NY (ELM)

Griffiss AFB, NY (RME)
John F. Kennedy Int'l, NY (JFK/N90*)
La Guardia, NY (LGA)
Rochester Monroe County, NY (ROC)
Syracuse Hancock Int'l, NY (SYR)

Asheville, NC (AVL)
Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)
Greensboro Regional, NC (GSO)
Raliegh Durham, NC (RDU)

Wilmington New Hanover County, NC (ILM)
Fargo Hector Field, ND (FAR)
Akron Canton Regional, OH (CAK)
Cleveland Hopkins Int'l., OH (CLE)
Columbus International, OH (CMH)

Dayton, OH (DAY)
Toledo Express, OH (TOL)
Youngstown, OH (YNG)
Oklahoma City Will Rogers, OK (OKC)
Tulsa International, OK (TUL)

Portland International, OR (PDX/P80*)
Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)
Philadelphia International, PA (PHL)

Pittsburgh Greater Int'l, PA (PIT)
Wilkes Barre, PA (AVP)
Providence, RI (PVD/G90*)
Charleston AFB Municipal, SC (CHS)
Columbia Metropolitan, SC (CAE)

Greer, SC (GSP)
Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)
Memphis International, TN (MEM)

Nashville Metropolitan, TN (BNA)
Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)
Beaumont Port Arthur, TX (BPT)

Corpus Christi, TX (CRP)
Dallas Love Field, TX (DAL)
Dallas/Ft. Worth Regional, TX (DFW/D10*)
El Paso International, TX (ELP)
Houston Hobby, TX (HOU)

Houston Intercontinental, TX (IAH)
Longview, TX (GCG)
Lubbock, TX (LBB)
Midland, TX (MAF)
San Antonio International, TX (SAT)

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Salt Lake City Int'l., UT (SLC/S56*)
Burlington International, VT (BTV)
Norfolk Regional, VA (ORF)
Richmond Byrd International, VA (RIC)
Roanoke, VA (ROA)

Washington Dulles Int'l, VA (IAD)
Seattle Tacoma Int'l, WA (SEA/S46*)
Spokane International, WA (GEG)
Charleston, WV (CRW)
Huntington, WV (HTS)

Green Bay Austin Straubel, WI (GRB)
Madison, WI (MSN)
Milwaukee Mitchell. WI (MKE)
Agana NAS, SP (GUM/ZUA*)
San International, PR (SJU/ZSU)

* Indicates that airport has terminal radar approach control (TRACON)

APPENDIX J

MEDIUM HUB AIRPORTS
FY 1989

City	State	Region	Location Identifier
Albuquerque	NM	ASW	ABQ
Anchorage	AK	AAL	ANC
Austin	TX	ASW	AUS
Buffalo	NY	AEA	BUF
Burbank	CA	AWP	BUR
Chicago Midway	IL	AGL	MDW
Cleveland	OH	AGL	CLE
Columbus	OH	AGL	CMH
Covington/Cincinnati	KY	ASO	CVG
Dallas Love Field	TX	ASW	DAL
Dayton	OH	AGL	DAY
El Paso	TX	ASW	ELP
Fort Myers	FL	ASO	RSW
Fort Lauderdale	FL	ASO	FLL
Hartford	CT	ANE	BDL
Houston Hobby	TX	ASW	HOU
Indianapolis	IN	AGL	IND
Jacksonville	FL	ASO	JAX
Kahului	HI	AWP	OGG
Lihue	HI	AWP	LIH
Memphis	TN	ASO	MEM
Milwaukee	WI	AGL	MKE
Nashville	TN	ASO	BNA
New Orleans	LA	ASW	MSY
Norfolk	VA	AEA	ORF
Oakland	CA	AWP	OAK
Oklahoma City	OK	ASW	OKC
Ontario	CA	AWP	ONT
Portland	OR	ANM	PDX
Raleigh/Durham	NC	ASO	RDU

(continued on next page)

MEDIUM HUB AIRPORTS
FY 1989

City	State	Region	Location Identifier
Reno	NV	AWP	RNO
Rochester	NY	AEA	ROC
Sacremento	CA	AWP	SMF
San Antonio	TX	ASW	SAT
San Jose	CA	AWP	SJC
San Juan	PR	ASO	SJU
Santa Ana	CA	AWP	SNA
Tucson	AZ	AWP	TUS
Tulsa	OK	ASW	TUL
West Palm Beach	FL	ASO	PBI

Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.

APPENDIX K

SMALL HUB AIRPORTS
FY 1989

City	State	Region	Location Identifier
Agana	SP	AWP	NGM
Albany	NY	AEA	ALB
Allentown	PA	AEA	ABE
Amarillo	TX	ASW	AMA
Baton Rouge	LA	ASW	BTR
Billings	MT	ANM	BIL
Birmingham	AL	ASO	BHM
Boise	ID	ANM	BOI
Burlington	VT	ANE	BTV
Cedar Rapids	IA	ACE	CID
Charleston	SC	ASO	CHS
Charlotte Amalie	VI	ASO	STT
Chattanooga	TN	ASO	CHA
Colorado Springs	CO	ANM	COS
Columbia	SC	ASO	CAE
Corpus Christi	TX	AWP	CRP
Daytona Beach	FL	ASO	DAB
Des Moines	IA	ACE	DSM
Detroit	MI	AGL	DET
Eugene	OR	ANM	EUG
Fairbanks	AK	AAL	FAI
Fort Wayne	IN	AGL	FWA
Fresno	CA	AWP	FAT
Grand Rapids	MI	AGL	GRR
Greensboro	NC	ASO	GSO
Greer	SC	ASO	GSP
Harlingen	TX	ASW	HRL
Hilo	HI	AWP	ITO
Huntsville	AL	ASO	HSV
Islip	NY	AEA	ISP

(continued on next page)

SMALL HUB AIRPORTS
FY 1989

City	State	Region	Location Identifier
Jackson	MS	ASO	JAN
Kialua-Kona	HI	AWP	KOA
Knoxville	TN	ASO	TYS
Lexington	KY	ASO	LEX
Little Rock	AR	ASW	LIT
Long Beach	CA	AWP	LGB
Louisville	KY	ASO	SDF
Lubbock	TX	AWP	LBB
Madison	WI	AGL	MSN
Manchester	NH	ANE	MHT
Melbourne	FL	ASO	MLB
Middletown	PA	AEA	MDT
Midland	TX	ASW	MAF
Mobile	AL	ASO	MOB
Moline	IL	AGL	MLI
Myrtle Beach	SC	ASO	MYR
Omaha	NE	ACE	OMA
Palm Springs	CA	AWP	PSP
Pensacola	FL	ASO	PNS
Portland	ME	ANE	PWM
Providence	RI	ANE	PVD
Richmond	VA	AEA	RIC
Roanoke	VA	AEA	ROA
Saginaw	MI	AGL	MBS
Santa Barbara	CA	AWP	SBA
Sarasota/Bradenton	FL	ASO	SRQ
Savannah	GA	ASO	SAV
Shreveport	LA	ASW	SHV
Sioux Falls	SD	AGL	FSD
South Bend	IN	AGL	SBN
Spokane	WA	ANM	GEG
Tallahassee	FL	ASO	TLH
Toledo	OH	AGL	TOL
Wichita	KS	ACE	ICT

Source: FAA TERMINAL AREA FORECASTS FY 1991-2005.